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McGregor (E. A.). **The Red Spider on Cotton.**—*U.S. Bureau of Entomology*, Circular no. 172, 17th May 1913, 22 pp., 12 figs., 4 tables.

With the exception of an outbreak in Louisiana in 1893, a severe occurrence of the 'red spider' (*Tetranychus bimaculatus*, Harvey) on cotton had not been recorded till the 1903 outbreak in South Carolina and Georgia. In the following years the pest was also reported from North Carolina and Alabama. Its presence is now established from Maine to Florida and westward to California and Hawaii. With the exception of Western Colorado and parts of California no serious complaints have been received other than from the south-eastern portion of the cotton belt.

The 'red spider' colonies live on the underside of the cotton leaves, and their constant feeding causes blood-red spots to appear on the tops of the leaves. The effect upon the cotton plant is that the leaves drop one by one, until usually the plant dies. The female mite lays about 50 to 60 eggs which, in the summer, hatch in about four days. The newly hatched mite moults in two days, and two days are also required for each of the two nymphal stages. Mating takes place immediately after the emergence of the adult and the life-cycle is completed soon after. In South Carolina there are probably 16 or 17 generations in an average year. A severe winter favours the increase of the mite by destroying its natural enemies, while mild weather favours the latter.

Of these a Cecidomyid fly, *Arthrocnodax* sp., and the Anthocorid bug, *Triphleps insidiosus*, are the most important. Further enemies of the 'red spider' in cotton-fields are *Chrysopa quadripunctata*, *Euthrips fuscus*, *E. occidentalis*, *Scolothrips sexmaculatus*, *Coccinella 9-notata*, *Hippodamia convergens*, and *Stethorus (Scymnus) punctum*.

The most effective preventive measures against the pest are clean cultivation, especially weed destruction, and a trap crop of cotton round the boundary of a field. Most cases of infestation in urban localities have their origin in borders of cultivated violet. The latter should either be repeatedly sprayed or entirely destroyed. Care should be exercised in selecting relatively immune varieties of cotton. Since 'red spider' also infests many other cultivated plants, rotation is useless.

Regarding remedial measures the pulling up and burning of the first few plants which show infestation is in some cases extremely effective in eradicating the pest. Once the latter has been established it is most difficult to wipe out. Effective sprays used during the 1911 season are, solutions in 100 gals. of water of (1) 3 lb. potassium sulphide ($0.75); (2) 15 lb. flowers of sulphur, 20 lb. fresh lime ($1.40); (3) 5 gals. miscible oil ($5.00); (4) 16·5 lb. potassium permanganate ($8.25); (5) 2·5 gals. miscible oil, 26 oz. Blackley tobacco extract (40 per cent. nicotin sulphate), ($4.50); (6) 28 lb. flowers of sulphur, 14 oz. soft soap ($1.47). The flour paste spray recommended by W. B. Parker [see this *Review*, Ser. A., i, p. 240] was also used with success. A contact insecticide is absolutely necessary, and it must be applied so as to hit the entire underside of every leaf of an infested plant. A

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second application should be made a week after the first in order to kill the individuals that were not hatched at the time of the first spraying.

Mendes (C.). **Apparecimento da** *Icerya purchasi* **e** *Novius cardinalis* **em S. Fiel.** [Appearance of *Icerya purchasi* and *Novius cardinalis* in Portugal.]—*Broteria, Salamanca,* xi, pt. 2, Ser. Zool., June 1913, p. 146.

In the early summer of 1910 it was observed that the trunks and branches of *Acacia melanoxylon* on the farm belonging to the College of S. Fiel (Beira Baixa) were more or less covered with *Icerya purchasi*. The insect had never been observed before on this site nor had it been found on the orange trees in the vicinity. The Acacias were completely covered in a short time, but a little later it was observed that the scale was being attacked and cleared off by a coleopterous larva which ultimately completely cleared the trees. This larva was identified as that of *Novius cardinalis* by M. N. Martin, who also discovered that *I. purchasi* had invaded orange groves at Castello Bramo, 12 miles away, and was known there as a pest. The affected oranges there had been thrown on to the dunghills and the insect was detected on Acacias soon afterwards. The noteworthy fact is the sudden and unexpected appearance of *N. cardinalis* on the spot and the clearance of the trees within the year. The author strongly urges the artificial cultivation of the Coccinellid as a beneficial insect.

Witt (D. O.). **Notes on the Life-History of** *Cyrtotrachelus longipes*.—*Indian Forester,* xxxix, June 1913, pp. 265-272, 1 pl.

The Curculionid, *Cyrtotrachelus longipes,* previously recorded from *Melocanna bambusoides,* attacked a plantation of *Dendrocalamus strictus* in the Gharakota Reserve of the Saugor Forest Division in the Central Provinces. The beetles appear about July or August, depending on the state of the monsoon. It is noteworthy that the appearance of the beetle coincides with the sprouting of the new bamboo shoots on which the eggs are laid. The eggs are not necessarily deposited just above an internode as stated by E. P. Stebbing, the author having found them at practically any part of an internode. The eggs, from 2 to 4 of which are laid by one female on the same day, hatch out in from three to five days. The larva on hatching out does not at first bore horizontally through to the centre of the shoot as imagined by Stebbing, but rather in a slanting direction inwards, and it does not reach near the centre of the shoot until it is at least half-grown. With the exception of those instances in which the point of attack is very close to the ground, the larva never reaches the base of the shoot. In September the larva drops to the ground and there buries itself for pupation in a smooth oblong cell, no bamboo fibres being used in its composition. In this cell the pupa remains until the following July or August, when it emerges.

The method of digging up and burning the pupal cases as suggested by Stebbing is not satisfactory, owing to the depth to which the larvae burrow and the difficulty of finding the pupae. The best method of dealing with the pest is to collect the sluggish adult beetle by hand and burn infested culms, as is done with considerable success in the Gharakota Reserve.

Dammerman (K. W.). **De Hevea-termiet op Java.** [The Hevea termite in Java.]—*Mededeelingen van de Afdeeling voor Plantenziekten*, no. 3. *Dept. van Landbouw, Nijverheid en Handel, Buitenzorg*, 1913, 12 pp., 2 figs., 2 pl.

Until a few years ago it was thought that the termite *Coptotermes gestroi*, Wasm., did not occur in Java, but in 1911 and 1912 the Department of Agriculture in Batavia received a number of *Hevea* and *Ficus* trees which had been killed owing to the attacks of a termite which Dr. Holmgren referred to that species. It was subsequently found that this pest was known to the natives, in Western Java at least, as ' rinjoeh warangas.' *C. gestroi* is known in Malacca, Sumatra and Borneo, and there is reason to believe that it is indigenous to Java.

The plants attacked by this species are: —

Afzelia palembanica.
Albizzia procera.
Araucaria spp.
Artocarpus blumei.
Bombax malabaricum.
Canarium commune.
Cocos nucifera.
Dacrydium sp.
Dammara orientalis.
Dyera spp.
Eriodendron anfractuosum.
Ficus elastica.
Hevea brasiliensis.
Kumpassia malaccensis.
Mangifera odorata.
Ochanostachys amentacea.
Oncosperma filamentosum.
Oroxylon indicum.
Shorea spp.

The best method of dealing with the pest is to burn any infested trunks of *Hevea* or *Ficus* and clear the stumps with dynamite. Special attention must be paid to the presence of fungi, since *Coptotermes* cultivates the latter. The destruction of the termite's nest is not always practicable, besides it by no means ensures the destruction of the entire colony. The fumigation of the nests with sulphur and arsenic, applied with a special fumigation pump, such as the ' Universal Ant Destroyer,' is very effective and has the advantage of simplicity and cheapness. The nozzle of the pump should also be inserted into holes bored near the foot of infested rubber trees and the holes stopped with a tarred wooden plug. If the infested area and the number of hollow trees are small, it is useful to work the soil deeply in order to destroy the passages of *Coptotermes*, remembering that the latter are deeper in dry ground and nearer the surface in low-lying and damp ground. While the soil is being turned over a mixture of sawdust and Paris green (100 : 1) should be laid round the trees in a ring. A strict watch, however, must be kept for some time on the area so treated, since the termites hide themselves very efficiently and multiply with rapidity. It is

advisable not to use the wood of *Hevea* or other food-trees of *Coptotermes* in the construction of bridges, etc., and such outside woodwork should be thoroughly tarred.

WEYRICH (—.). **Bekämpfung des Heuwurmes im Jahre 1913.** [The campaign against the first generation of *Clysia ambiguella* in 1913.]—*Luxemburger Weinzeitung, Grevenmacher*, i, no. 24, 15th August 1913, pp. 406-409.

The author made a number of experiments to test the relative efficacy of nicotin and conchylin sprays against the first generation of *Clysia ambiguella*. Four plots of vines were sprayed (leaving a number of vines unsprayed for control purposes) with equal parts of copper sulphate, nicotin and lime (19th and 26th May), with nicotin and soft soap, with conchylin 1 : 4 (29th May) and with conchylin 1 : 5 (4th June), respectively. The first plot was examined on 14th and 18th of June, showing that 20 of the unsprayed stocks had 123 inflorescences* with 370 *Clysia*, whereas 20 sprayed ones only had 162 *Clysia* on 134 inflorescences. The experiences with the second plot are not recorded. On the third plot (25th June) 20 control stocks showed 340 *Clysia* on 102 inflorescences, whereas 96 inflorescences of the 20 sprayed stocks revealed 120 *Clysia*. The fourth plot (25th June) showed 255 *Clysia* on 90 inflorescences in the case of 20 unsprayed, and 126 on 78 inflorescences in the case of 20 sprayed stocks. The relatively unfavourable result of the last experiment is probably due to the vines having been sprayed when some of the inflorescences were already in bloom.

The spraying with nicotin required the same time as that with conchylin. One quart sufficed for about 12 to 15 stocks, which figures out at about 13 to 16 gallons of conchylin per acre. Including wages (12 days at four shillings) spraying one acre with conchylin costs between £3 15*s*. and £4, an expenditure that may be justified by results. The relative value of the two sprays against the second generation of the pest has yet to be determined.

According to the official report (1st August, 1913) the crop expectations in Luxemburg vineyards for this year are nil to 25 per cent., and in one case 50 per cent., owing to the ravages of *Clysia* and fungous diseases.

FINK (D. E.). **The Asparagus Miner and the Twelve-spotted Asparagus Beetle.**—*Agric. Expt. Station, Coll. Agric., Cornell Univ.*, Bull. 331, April 1913, pp. 411-435, 7 pls.

The authorship of the above paper, of which an abstract is given on p. 295 of this Review, Series A, was attributed in error to the Director of the Institute instead of to Mr. D. E. Fink.

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* The German 'Geschein' signifies the inflorescence of a vine only until the grapes are set. Ed.

Shtchegolev (I. M.). ВРЕДНЫЯ НАСѢКОМЫЯ И БОЛѢЗНИ РАСТЕНІЙ НАБЛЮДАВШІЯСЯ ВЪ ТАВРИЧЕСКОЙ ГУБЕРНІИ ВЪ ТЕЧЕНІЕ 1912 ГОДА [Report (of the Assistant Entomologist to the Zemstvo) on injurious insects and diseases of plants in the Government of Taurida during the year 1912]. Simferopol, 1913, pp. 24–56.

The author characterises the year under report as not being specially remarkable as regards insect pests, but they were nevertheless plentiful. The meteorological conditions of the year, while affording abundant food to the insects by way of weak and diseased plants, at the same time affected also their life and development. Of the usual annual garden pests in the province, *Rhynchites pauxillus*, Germ., was found in great numbers early in the spring, although it suffered considerably from the cold and windy weather. *Rhynchites bacchus*, L., and *Anthonomus pomorum*, L., appeared in smaller numbers; *Hyponomeuta malinellus*, L., was abundant without doing noticeable damage, as was also the case with *Carpocapsa pomonella*, L. Amongst other pests of fruit gardens the author mentions Aphids and Tortricidae, *Hoplocampa brevis*, Klug, *Psylla piri*, Foerst., *Tingis piri*, Geoffr., and *Phytoptus piri*. The insects injurious to grain and forests were more harmful, some of them swarming in certain parts of the country. *Brachycolus noxius*, Mordw., *Macrosiphum granarium*, Kirby, *Sipha* sp., and *Pentodon monodon*, F., were found in the districts of Dmitrov and Melitopol on beet, maize and onions. *Phlyctaenodes sticticalis*, L., *Lymantria dispar*, L., and *Lema melanopus*, L., appeared in great numbers, the latter on the grain fields of the district of Simferopol. *Pentaphis* has done great damage to wheat in some parts of the Government, and Tenebrionidae and Elateridae injured grain and bulb plants, as well as tobacco. *Hoplothrips tritici*, Kurd., was found on wheat in enormous numbers; *Anisoplia austriaca*, Hbst., which was expected in great numbers, damaged only a few fields. *Cecidomyia destructor*, *Cephus pygmaeus* and *C. tabidus* were also in evidence. This latter was reported to have attacked 15-20 per cent. of the crop. There were some complaints of damage by *Pachytylus migratorius*, L., but the number of these was not great. *Caloptenus italicus*, L., invaded the district of Dneprovsk and in some districts considerable damage was done by *Epicometis hirta*, Poda.

The author also give a description of an injury to wheat and barley, which is, in his opinion, caused by a special insect, as yet not fully identified. Mokrzecki ascribes this injury to *Tarsonemus spirifex*, Marchal.

The author records his investigations on *Hoplocampa brevis* and its parasite, *Bracon rotundatus*, Szp., which were conducted in Alushta and in Aktachi, where he captured the insect in special box traps on its emergence from the soil. The first insect in Alushta was discovered on a pear tree, the buds of which were not yet opened, on the 2nd April, and the eggs are deposited in the lower part of the bud. The author then sprayed the buds with an emulsion consisting of 16 gals. water, 1 qt. soft soap, and $\frac{1}{2}$ pint crude carbolic acid; this prevented the insects from

attacking further buds. The first specimen in Aktachi was noticed on 15th April. The author is of opinion that the insect winters in the earth and in the cups round the stalks. He advised that the soil should be first thoroughly pulverised and then well rammed, and where this advice has been acted upon the number of the insects diminished.

On the 30th April he visited the fields attacked by *Brachycholus noxius*, Mordw., at which time this insect was passing into the nymphal stage, whilst the first winged specimen was procured on the 5th May. The author does not approve of spraying as a remedy, but suggests dusting the young leaves of summer-sown seeds with superphosphate in powder or with basic slag, before they become tubular. He further advises reploughing the stubble to destroy the weeds, and the use of phosphatic manures. In his opinion, spraying could only be of use after the unfolding of the leaves, and then it is unnecessary as the influence of wind, rain, sun and parasites, would effect the destruction of *B. noxius*. Mention is made of one plot, previously manured with superphosphates, which, although attacked by the insect, very soon recovered. In the middle of May the author found in some fields that larvae of Coccinellids were devouring great numbers of *B. noxius*.

On the 23rd May he visited certain fields, parts of which were invaded by larvae of *Opatrum sabulosum*, L., as well as by those of an Elaterid beetle of the genus *Agriotes*. These insects were found only on one section of the field, where the soil was most friable and where there were many spots on which manure had been left and not spread, while the remaining parts of this field, as well as some neighbouring fields were free from them. The author attributes the appearance of these beetles to the favourable conditions for breeding. These lands were formerly folding places for cattle, thus accumulating large amounts of dung, and at the same time the industry of manufacturing "bricks" from animal dung, straw, etc., used for fuel and as a manure, exists there, which leads to large areas of land being covered by broken pieces of these "bricks." The beetles are usually attracted by the manure, breed there and in some years multiply to an extent injurious to the crops. The author suggests attracting the larvae of these beetles by baits of potatoes or cattle cake dug into the earth prior to the sowing of grain, and has also initiated experiments on manuring with basic slag and superphosphate.

In the same place some beetroot was found to be attacked by the caterpillars of *Agrotis segetum* and also by the above-named beetles. *A. segetum* was also found later to have damaged some wheatfields in the Government. In a garden in the same locality the author found *Lepidosaphes ulmi*, L., and *Mytilaspsis pomorum*, Bouché, on the trunks and branches of apple trees, as a remedy against which he suggested rubbing the insects off with bunches of bast and spraying the trunks and branches with kerosene emulsion.

In a garden situated near Alushta, high up in the mountains, the caterpillars of *Lymantria dispar* were found, and in lesser

numbers those of *Malacosoma neustria*, L. A few days later *Deltocephalus striatus* was found damaging wheat and reploughing the stubble was suggested as the best remedy. In the district of Theodosia *Epilachna globosa* had done a certain amount of damage and near Eupatoria *Anoecia corni* was discovered; this insect, however, is not yet known as a pest in this province.

As a protective remedy against *Toxoptera graminum* the author recommends the deep ploughing of the stubble fields, while in case of the appearance of these insects in the spring a harrow should be drawn over the seedlings and the young shoots should be sprayed with kerosene emulsion. In June the migration of *Pentodon monodon* was observed, as a protection against which he recommended ploughing a deep furrow round fields and individual plots. In some parts the population fought this insect by collecting it by hand, but the author does not regard the method as of much real value.

The author mentions also two predaceous beetles:—*Pardileus calceatus* and *Calosoma denticollis*. The former appeared in enormous quantities in the town of Simferopol and caused great annoyance to the inhabitants. The larvae of the second beetle destroy the larvae of *Phlyctaenodes sticticalis*.

An Additional Regulation under "The Vegetation Diseases Act, 1898," Tasmania. Hobart, 11th July 1913.

In addition to the ports of Hobart, Launceston, Devonport, and Burnie, the port of Stanley shall be a place at which all plants, other than fruit and vegetables, including corms, rhizomes, bulbs, and roots lawfully imported into Tasmania, may be landed.

Mokrzecki (S. A.). ЛУГОВОЙ МОТЫЛЕКЪ ЕГО ЖИЗНЬ И МѢРЫ БОРЬБЫ СЪ НИМЪ [*Phlyctaenodes sticticalis*, L.; its life-history and methods of fighting it]. Simferopol, 1913. 34 pp.

The author begins by giving a short history of the extraordinary outbreak of this pest in the year 1901, when, especially at the end of the summer, it covered tens of thousands of acres in the Government of Taurida and also invaded other parts of Russia and Siberia. The amount of damage done in that year was calculated in millions of rubles. Last year (1912) the insect reappeared in greater numbers than in the previous years, and in the opinion of the author it is very likely that there will be a further increase this year. This Pyralid moth is found everywhere in European Russia, as well as in Siberia and Russian Turkestan. According to F. B. Paddock it has been imported into the United States, where it was first found in 1869, and did considerable damage to the beet-root crops in 1909 and 1910.

There are two broods of *P. sticticalis* in the province of Taurida, one in spring and another in summer. The first brood emerges during May, and the life of the imago is about two weeks.

The eggs are laid on the smaller grasses, generally on the lower sides of the leaves, in lines and singly, and each female lays on an average about 60-70 eggs, and even 100 according to some authors. The statement of Paddock (Jl. Econ. Entom., Dec. 1912) that in America the females lay 500-700 eggs seems to the author to be unlikely. In the province of Taurida the caterpillars of the first generation hatch out about the 23rd May, the maximum being reached about the 3rd of the month, when the migrations begin. The whole life of these caterpillars does not occupy more than 3 weeks, pupation taking place about the second and third week in June. The pupa stage lasts three weeks and the caterpillars of the second brood appear in masses towards the end of July, starting their migrations about the middle of August, after having devoured all the plants around the place of their birth, amongst which plants the author specially mentions:—*Salsola kali, Atriplex patilus, Centaurea diffusa, Convolvulus arvensis, Amarantus retroflexus, Setaria viridis,* and wormwood. The army of caterpillars moves in big columns and at a distance of about two inches one after the other, starting at about 9-10 o'clock in the morning and proceeding usually in a direction from east to west, or occasionally from south-west to north-east, till the evening. These armies frequently cover an area of many square miles. The caterpillars eat all sorts of plants, except certain grasses and Solanaceae, but in the absence of other food they will eat even these. They eat the leaves and bark of the young shoots of all deciduous trees, and attack even certain fir trees found in the steppes. The grasses which they do not normally touch are, *Setaria viridis, Triticum repens, T. caesium, Festuca ovina, Stipa* and some others. The author points out that it is very common for many insects not to touch plants the leaves of which contain silica, and that it has been experimentally proved that if this substance be artificially excluded these same plants will be readily eaten. By the beginning of September all the caterpillars of the second generation have passed into the earth and there hibernate as pupae.

The author's statements as to the number of generations is at variance with those of some other observers, who report three and even five generations during one summer. Vassiliev has succeeded in obtaining in the laboratory a third generation, while Paddock reports a third generation for North America. But the author points out that most of the caterpillars hatched from late-laid eggs must probably perish, as in August the grass in the steppes is all dried up. Although hundreds of caterpillars and cocoons were collected by him in August, in no case did a moth emerge from these in the same season.

The following birds are mentioned as being useful in keeping down this pest:—rooks, larks, starlings, and swallows; while the larvae are devoured by the large ground beetle, *Calosoma denticolle*, Gebl. Various undetermined parasites of the families Ichneumondae and Braconidae have been bred; and *Anthrolytus dissimilis*, Kurd., which pupates in single cocoons on the ends of steppe-grasses, is stated to be very effective in destroying the caterpillars.

Besides parasites, flacherie was also noticed to be prevalent among the caterpillars, and the development of these insects is also hampered by the infertility of the females of the second generation. This was noticed in 1902 and even in 1901 in some parts of North Russia, and, according to Pospelow, it is due to the great heat of the summer and lack of moisture, which delays the process of maturation of the eggs in the bodies of the imagos. This has been experimentally proved by Vassiliev.

The author mentions cases brought to his notice by veterinary surgeons of gastric troubles set up in domestic animals after eating grass on which the caterpillars had fed or were feeding.

To protect gardens and cultivated fields from invasion by the caterpillars it is recommended to dig round them a ditch about 2 feet deep, with overhanging sides and containing water. If water cannot be obtained the bottom may be covered with naphtha waste, tar, treacle, or caustic lime. Grass on the edges of the ditches should be poisoned by sprinkling it with a mixture of Paris green and lime in water (1 lb. of green, 2 lb. of lime, and about 55 gals. of water) or with "azurgin," which is more effective (about $\frac{1}{2}$ oz. of green in about 2 oz. of ammonia diluted to about 5 gallons with water). The effect of azurgin is two-fold, it being both a stomach and a contact poison. The use of brushwood trailers for crushing the larvae is also recommended.

In the case of market-gardens, the vegetables should be covered with earth till the caterpillars have passed. In these gardens insecticides also can be used, such as decoctions of tobacco extract with soap, carbolic emulsion or kerosene emulsion, as well as hot water (about 75° C.). The best insecticide is barium chloride in a 2 per cent. solution in water; to make the solution more sticky $1\frac{1}{2}$-2 lb. of treacle or $\frac{1}{4}$-lb. of soda can be added. The author also recommends the protection of fields or gardens by sowing round them a belt of about 50 yards of oats or some other grain, which will keep away the larvae, as they seldom attack such forage crops. Trees can be protected by belts (cardboard hoods with tanglefoot smeared on the inside) or by winding rags soaked with kerosene or carbolic mixtures round their stems, remoistening them every two days. To prevent the emergence of the insects in the following spring the author recommends deep ploughing in the autumn or early spring of the fields on which they winter.

Мокrzecki (S. A.). ВРЕДНЫЯ НАСѢКОМЫЯ И БОЛѢЗНИ РАСТЕНІЙ НАБЛЮДАВШІЯСЯ ВЪ ТАВРИЧЕСКОЙ ГУБЕРНІИ ВЪ ТЕЧЕНІЕ 1912 ГОДА [Report (of the Chief Entomologist to the Zemstvo) on injurious insects and diseases of plants in the Government of Taurida during the year 1912]. Simferopol, 1913, pp. 1–23.

Psylla pyri, L., has greatly increased in the pear orchards of the valleys of Katchi and Belbeka and near Alushta, attacking the dwarf and medium-sized trees, interfering with the growth and causing the leaves and ovaries to fall off and the fruits to be misshapen. In his previous reports the author has already pointed out that in this province this insect winters in the egg stage, thus

resembling *Psylla mali*, Foerst, which, however, is totally absent there. This statement is at variance with those of other authors, such as Slingerland in America, Schreiner in Russia, and Berner in Germany, that it winters in the imago stage. In the Crimea this insect flies during the whole winter, and at the same time the eggs may be found on the trees, together with their usual companion, the fungus *Capnodium*. The eggs have no stalk and no long thread in the form of a tail, as described by the above-named authors, and it is possible that it may be a distinct species. The successful fighting of the insect can be done preferably in the winter and in the early spring. During the winter the pear trees attacked should be sprayed with a 3 per cent. or 4 per cent. solution of iron sulphate (9-12 lb. in about 27 gallons of water); in the spring the blossoms, the buds and leaves should be sprayed with a decoction of quassia with soft soap or of tobacco extract with soft soap. Later on it is very difficult to fight the insect; after the fall of the leaves the pears ought to be repeatedly sprayed either with a 1 per cent. solution of Avenarius' carbolineum, or with a kerosene emulsion, or with quassia.

Lymantria dispar, L., has laid its eggs in such enormous quantities in the forests of the mountains of the Crimea that both the Central Government and the Zemstvo have ordered the author to investigate the matter specially. In his opinion, fighting the insect in the forests is very difficult and expensive, and at the same time quite unnecessary, as this is done there more successfully by parasites. Amongst the latter he mentions *Hadronotus* (*Telenomus*) *howardi*, Mokr., which usually destroys 75-80 per cent. of the eggs of *L. dispar* in the Crimea; *Apanteles fulvipes*, Hal., *A. solitarius*, Ratz., and *Pristomerus vulnerator*, Panz., which all parasitise the young caterpillars; while when adult they are attacked by *Sarcophaga affinis*, Fall., *Roeselia antiqua*, Mg., and *Scotia saturniae*, R. D. The question bears a different aspect in gardens or parks, where the destruction of the eggs is of importance. This can be accomplished either by hand, by scraping the eggs from the bark of the trees, or by soaking the sponge-like mass of eggs with crude oil, kerosene or carbolineum. Experience in the Crimea shows the crude oil method to be the cheapest, while the hand method is the most expensive. In 1902 the soaking of the egg-masses with a mixture of kerosene and tar over an area of 549 acres (44,500 egg-masses) cost about £4 18*s.* 0*d.*; while the scraping and collecting of 248 lb. of eggs over an area of 726 acres in 1899 was done at a cost of about £24; and in 1907 the soaking of eggs over 732 acres cost £1. To prevent the caterpillars from getting on to the trees the application of tanglefoot is suggested while for the destruction of the larvae spraying with 'djipsin-rublew' or with a solution of Paris green in ammonia diluted with water, is recommended.

Phlyctaenodes sticticalis, L., has appeared in great numbers in different parts of the Government and has done considerable damage to the grasses in the steppes and to the vegetables in the "bashtans" (melon and cucumber gardens). The author mentions two parasites of this insect, *Apanteles vanessae*, Reinh., and *Anthrolytus dissimilis*, Kurd.

Carpocapsa pomonella, L., appeared in small numbers during 1912 owing to the destruction of the apple and pear blossom by frosts. The caterpillars were observed to be attacked by an unknown fungus disease. Besides spraying, wrapping the trunks of the small and middle-sized trees with sacking and the use of bait-belts against the caterpillars of the second generation are also recommended. With regard to the practical value of the experiments on the artificial breeding of the egg parasite, *Oophthora semblidis*, Aur. (*Pentarthron carpocapsae*, Ashm.), the author prefers to leave the matter an open question and cautions growers against exaggerated expectations. He mentions the practical failure of these experiments in America, as well as of similar experiments undertaken by Lounsbury to acclimatise the American parasite *Trichogramma pretiosa* in South Africa, as well as *Calliephialtes messer*, *Pimpla heliophila* and *Hymenobosmina pomonella*. The recorded satisfactory results of the transportation of some parasites from Astrachan to Turkestan, according to the author, has aroused many questions and doubts on the part of entomologists.

Ino ampelophaga has done considerable damage to vineyards —in some districts of Theodosia, Novorossisk and Anapa on the Black Sea. Although very injurious, the biology of the insect has been very little studied. In the Crimea there is only one generation yearly, although other authors speak of two or even three. The caterpillars appear after wintering at the end of March or at the beginning of April and eat half-way into the buds, feeding later on the leaves. At the end of May they are full-grown and get underneath the bark of the vine branches where they pupate, the imago emerging at the beginning of June. Fresh caterpillars appear in July which feed very little and soon hibernate underneath the bark, etc. The author has obtained two parasites from the caterpillars:—*Exorista grandis*, Zett., and *Pteromalus* sp. The remedies against this insect are, (1) the cleaning of the old bark from the vine stocks, (2) pruning by Desemery's method, (3) the smearing of tanglefoot on the branches in the spring, and (4) different insecticides. While the caterpillars are still young a decoction of quassia and soap, or of tobacco extract with soap can be used. When the leaves appear they should be sprayed with a 3 per cent. solution of barium chloride.

Chionaspis euonymi, Comst., appeared last summer on *Euonymus japonicus*, L., in Yalta and was also observed by the author in the previous autumn on the same plant in the Botanical Garden of Tiflis. The specimens procured in Yalta produced a parasite of the genus *Aspidiotiphagus*, which genus has not thus far been known to exist in Europe, only one species being found in California. Among useful remedies the author suggests the smearing of the stems with carbolineum during the winter, and spraying in the spring with an emulsion of crude linseed oil (1 lb. of soap dissolved in about 20 gallons of water to which are added 13½ pints of the oil). This mixture is also effective against *Lepidosaphes ulmi* and *Diaspis fallax*, Horv.

Euthrips pyri, Daniel, was found in March 1912 on some pear trees in Alushta, the identification having been confirmed later

by specimens received through Howard from America. This insect was also found in the year 1909 on some pear buds in the district of Theodosia. Up till now it has not done any noticeable damage in the Crimea, although very harmful in California and more recently in New York.

Amongst the insects injurious to cereals, the author mentions *Brachycolus noxius*, Mordw., as having done considerable damage in the district of Eupatoria. The injury was noticed at the beginning of April and an examination of the diseased plants showed that single stem-mothers of this aphis appeared in the tube of the middle leaf, where they were sometimes accompanied by colonies of young. The middle leaves and lateral offsets of the infested plants turned purple and the crops ceased growing and tillering; the early winter seedlings last August and September were the most damaged, while those appearing this spring (1913) were practically uninfested. The insects even attacked plants specially manured with basic slag. Besides *B. noxius*, stem-mothers of *Macrosiphum cerealis*, Kalt., were also found on the leaves of wheat. As far back as 1900 the author found some parasites of this insect, to which he now adds *Dioretus obsoletus*, Kurd.

Oscinis frit, L., was found in small numbers in some districts of the Government on fallen barley and oats. The flying of this insect, as well as of *Cecidomyia destructor* ceases on the 10th September, so that the seeds sown after the middle of September are not infested by it. In 1909 a parasite, identified by Kurdjumov as *Polyscytus oscinidis*, Kurd., sp. n., was obtained from pupae of *O. frit*.

Никитин (I. V.). ПЛОДОЖОРКА ПО ДАННЫМЪ ПОЛТАВСКОЙ СЕЛЬСКО-ХОЗЯЙСТВЕННОЙ ОПЫТНОЙ СТАНЦІИ [*Carpocapsa pomonella*, L.; results of investigations by the Experiment Station of Poltava]. Reports of the Agric. Expt. Sta. of Poltava, branch of Agric. Entom., no. 16, v, Poltava 1913, 73 pp. (With a preface by N. B. Kurdjumov.)

This is a report on experiments on spraying trees by means of the "driving spray method" as recommended by Ball in America. In a preface N. V. Kurdjumov gives a review of this method and of the experiments and results obtained by Ball, Melander, Quaintance and others. A bibliography of the method is appended to the preface.

The first part of the report is devoted to the biology of *Laspeyresia* (*Carpocapsa*) *pomonella* in the Government of Poltava. The insects winter there as caterpillars inside cocoons of fine silk, which are usually constructed in dry situations, as in wet places the larvae are likely to be infected by a fungus. Of 100 such caterpillars examined in 1911 it was found that 52 per cent. were healthy, 13 per cent. dead owing to parasites, 10 per cent. dead from fungus disease and 25 per cent. dead from unknown causes. The observations for the year 1912 have yielded slightly different figures. There were 67·09 per cent. of healthy

caterpillars, 14·40 per cent. were dead from unknown causes, 6·17 per cent. were parasitised, 11·31 per cent. were dead from fungus attack, and 1·03 per cent. were killed by the larvae of a predaceous beetle, *Malachius bipustulatus*. The averages for the two years show that about 60 per cent. of caterpillars survive the winter in a healthy condition, out of which however a considerable number, about 20 per cent. of the whole of the wintering caterpillars, either do not pupate or, if they do, produce no imagos, so that only 40 per cent. of the wintering insects emerge in the spring. Pupation begins early in May and continues till the beginning of July; in the insectarium the pupal stage lasts from 12 to 34 days. The eggs are laid during the early period of the season on leaves, but after the apples have developed most of the eggs are laid on them. They are usually laid singly and no particular spot on the leaves or fruits is selected. The caterpillars of the first generation are found inside the fruits after the middle of June and their numbers increase steadily up to the middle of July. They remain inside the fruits about a month and start leaving the latter about the second week of July. The pupation of the first generation takes place during the second half of July. Only about 10 per cent. of the caterpillars of the first generation pupate and produce perfect insects, the remainder winter and pupate only in the next spring. About 8 per cent. perish from parasites and different diseases. The above figures are the averages obtained during both years from observations on the caterpillars found in bait belts and on those in the insectarium. The imagos of the first generation begin flying early in August and are numerous during the second half of the month. The caterpillars of the second generation may be found after the middle of August and in great numbers in the early days of September. Owing to their late appearance not all of them are able to accomplish their development, only those which appear about the middle of the month being able to leave the fruit in the middle of September and to make a cocoon in which to pass the winter.

Two tables are appended to this chapter of the report showing diagrammatically the results of experiments in spraying different parts of fruit gardens by various methods in relation to the absolute and relative percentage of apples damaged by the caterpillars of either generation. The diagrams go to show that on the whole the first generation damages a smaller amount of fruit, while the second generation does less substantial damage, as these caterpillars often make only a small passage underneath the skin of the apple and leave it afterwards, the apples being able to recover.

The figure given above as to the number of caterpillars perishing from parasites relates to the wintering caterpillars, but investigations during the summer on caterpillars found in fallen fruit and under the belt baits showed that the number parasitised is also small. During the years under report there have been found the following parasites of *L. pomonella*.

(1) *Ephialtes* sp., an ecto-parasite of the larvae; only two specimens were obtained.

(2) *Pimpla sagax*, Htg.; a single specimen.

(3) *Dioctes exareolatus*, Ratz. (evidently the same as *Campoplex pomorum*, Ratz.), an internal parasite living on the small caterpillars (4-7 mm.); its cocoons are found usually in the calices of the fruits, where the caterpillars pass the early part of their life. In 1911, 7 or 8 specimens of this parasite were obtained at the end of June; in 1911 it was not obtained, although a single empty cocoon of it was found.

(4) *Bracon* sp.; a single specimen.

(5) *Pristomerus schreineri*, Ashm.; an internal parasite of the wintering caterpillars; two examples were bred.

(6) *Pentarthron* (*Trichogramma*) *fasciatum*, Perkins (identified by A. A. Girault, probably synonymous with *Encyrtus embryophagus*, Hartig); in 1911 two specimens were obtained from one egg of *L. pomonella;* in 1912 one was hatched out of an egg of another Tortricid.

(7) *Phygadeuon* sp., an ecto-parasite of the caterpillars; two specimens were obtained. The biology of this parasite is fully described. It attacks only caterpillars in their cocoons, and the oviposition occupies a long time (1-1½ hours), as the parasite first paralyses the caterpillar by piercing it with its ovipositor. By supplying it with disabled caterpillars one parasite was observed to lay as many as 10 eggs in one day, and after it had laid 18 eggs its ovipositor was bitten away by a caterpillar.

(8) A Tachinid fly, as yet unidentified, was the most frequent parasite found, infesting about 3-4 per cent. of the caterpillars.

(9) Two larvae of Syrphid flies were also found on the 20th August on dead caterpillars inside some apples; the larvae lived for 2 to 3 weeks afterwards, but no flies were obtained.

As stated above, the caterpillars are also destroyed by *Malachius bipustulatus*, the larvae of which beetle, often found underneath the bark of trees, penetrate inside the cocoons and attack them. The biology of this beetle has not yet been studied.

A "small speckled woodpecker" was observed in a garden on the 30th August in the act of devouring the caterpillars, whose cocoons it extracted from underneath the bark of an old pear tree.

The second part of the pamphlet contains a report on spraying experiments conducted during both years; in the report, as well as in a special appendix, there are numerous tables and diagrams giving detailed information as to the number of caterpillars found, the number and percentage of injured apples, the amount of financial damage, the percentage of fallen fruits, etc., for different parts of the gardens, for certain individual trees and for different weeks of the season. The tables also contain figures as to the number of apples injured through the calyx and directly through the fruit, and the cost of spraying is also given in some cases. A garden was divided into three parts; one part was left unsprayed; the second part was sprayed by the ordinary method (from below, with the Vermorel nozzle, giving a revolving spray; a Seneka nozzle was used for spraying the crowns of the trees); and the third part was sprayed by the "driving spray" method by means of the "Pomona" and "Monarch" apparatus. The insecticide used for the ordinary spraying was Paris green in the proportion of 1 lb. of green in

about 110 gallons of water, to which was added a corresponding amount of freshly slacked lime. The driving spray method aims at getting the poison into the calyx cup, so that after the closing of the sepals it should remain there and poison the young caterpillars visiting the calyx and there taking their first food. In order to be effective and to get the poison into the calyx the spraying must be done immediately after the petals have fallen. It is done under high pressure and not from below, but from a specially built ladder, the pressure used being 10 or more atmospheres. As an insecticide for this method Paris green was again used, but without any lime and in a solution of half the above strength; the Seneka nozzle was employed. In 1912 the spraying was done under slightly different conditions, the garden being divided into 8 parts, one part being again left unsprayed, one part being sprayed with Djipsin (1 lb. to 110 gallons of water) by means of the driving spray method, and the remaining 6 parts were sprayed by one or other method, as in the previous year, except that in one instance the insecticide used was Paris green (1 lb. in 110 gallons of water) without lime, but with ammonia (under high pressure by the driving spray method).

The result of the experiments of both years can be summarised as follows:—The best results were obtained from spraying by the ordinary method, repeated 5 times; the first generation of caterpillars did less injury in those parts of the garden which were sprayed by the driving spray method, while against the caterpillars of the second generation the ordinary method repeated 5 times appears to have proved to be the best remedy. The average figures for both years are:—on the unsprayed parts, injured apples 28·81 per cent.; on the part sprayed by the ordinary method 4·76 per cent.; on the part sprayed by the driving spray method 7·98 per cent. The part sprayed with Paris green with ammonia gave 3·54 per cent. of wormy apples, and the part sprayed with Djipsin only 3·10 per cent. These results are not so good as those obtained in America, where stronger solutions of the insecticide were used. Ball recommends the use of 2 to 5 lb. of Djipsin in about 80 gallons of water, to which recipe the report draws the attention of growers.

The spraying also affected *Rhynchites bacchus* and *R. aequatus*, which in 1911 damaged 20·39 per cent. of the apples in the unsprayed part; in the part sprayed by the driving spray method, 13·61 per cent.; and in the part sprayed by the ordinary method 5 times, 6·01 per cent. The best results were obtained from Paris green with ammonia, when the percentage of apples injured by these insects was only 2·04.

Radetsky (A. F.). ЯБЛОННАЯ ПЛОДОЖОРКА ВЪ ТУРКЕСТАНСКОМЪ КРАѢ И БОРЬБА СЪ НЕЮ. ТУРКЕСТАНСКАЯ ЭНТОМОЛОГИЧЕСКАЯ СТАНЦІЯ [*Carpocapsa pomonella*, L., in the territory of Turkestan and the struggle against it]. Turkestan Entomological Station Reports. Tashkent, 1913, pp. 52, 5 figs., 3 diagrams.

The author states that *Laspeyresia* (*Carpocapsa*) *pomonella* is the most serious enemy of fruit in Russian Turkestan and that all

the other fruit pests found there do not cause as much as a quarter of the injury for which it is responsible. The greatest amount of injury is done to apples and, after these, to pears. In Turkestan, the variety of apples known as "Belle fleur" and "Kalvile" suffer the most, while "Selenka Vuda" is the least affected; plums, cherries, peaches, apricots, quinces, haws, walnuts, chestnuts, etc., are also exposed to attack by this insect, but the percentage of injured fruits is very small. The author has bred caterpillars in captivity on apple seeds only, and is satisfied that they can feed exclusively on leaves, thus keeping alive till the next year.

The very small number of parasites of *L. pomonella* found in Turkestan tends to support the view that it has been only recently imported into that area without its natural enemies, and that it lives there under conditions similar to those in America. The investigations of I. V. Vassiliev during the years 1909 and 1910 proved the total absence of parasites of the eggs, caterpillars or pupae of this insect, which then appeared in enormous numbers. In 1911 the author found in gardens near Tashkent two species of parasite, although only about 2 per cent. of the caterpillars was infested by them. In 1912 one of these parasites, *Ascogaster canifrons*, Wesm., was found to be infesting 15 per cent. of the caterpillars of *L. pomonella*, appearing chiefly in the gardens near Tashkent, while its numbers diminished gradually in proportion to the distance from the town, and it was completely absent in remote districts. This is in accordance with the view expressed by the author in a previous work, that the parasite also has been only recently imported into the country and is gradually spreading.

The journeys undertaken by the author during the summer of 1912 led him to change his views on the subject of the importation of *L. pomonella*. He visited some remote villages in the province of Samarkand which have never previously been visited by Europeans, and which have no communications with the towns; the natives cultivate certain local varieties of apple and these were found to be infected by *L. pomonella*. The natives stated that even 50 years ago their apples were "wormy." The author is not prepared to attach too much importance to these statements, and says that allowance must be made for the possibility of this damage to the fruit being due to *Grapholitha funebrana*, Tr., which undoubtedly belongs to the local fauna and attacks some sorts of apples. At the same time, the author found specimens of *L. pomonella* in the mountain parts of the provinces of Samarkand and Fergan on wild apple trees. These parts are seldom visited even by the natives, so that there can be no question of the importation of the insect from centres of European cultivation. He also found this insect in the celebrated gardens of Isfara, on peaches.

In all these instances the percentage of infected fruits was very small, in comparison with the damage done by the insect in cultivated gardens. From the caterpillars collected by the author in the native districts, which pupated in captivity he obtained a parasite of the genus *Pimpla*, which is not found near the large,

new Russian towns of the country. All this leads the author to conclude that *L. pomonella* belongs to the local fauna and existed in the country even before the Russian conquest. But this conclusion does not affect the theory of its being also imported with cultivated apples by the Russians, which probably holds good for the orchards of the large towns. The orchards near the centres of the towns are swarming with the insects, while their numbers decrease towards the periphery. In the province of Syr-Darya the pest is found in enormous quantities in the large garden district near Tashkent, while in all other parts of the province, though found in all cultivated Russian orchards, its numbers are smaller. It is also found everywhere in the gardens of the province of Samarkand, again in greater numbers near to Samarkand itself and in the province of Fergan. In the Transcaspian province it appears in smaller numbers, as, owing to the absence of water, the cultivation of apples is not much developed.

With regard to Bokhara, M. Siazoff reported that he found this insect on the northern slopes of Kara-Taga, while it is totally absent from the gardens of the new Russian town of Termesa on the frontier of Afghanistan. The percentages of the apple crops damaged by the codling moth in Turkestan for the year 1911-1912 were:—for the province of Syr-Darya, about 85 per cent.; for the province of Samarkand, 80 per cent.; and for the province of Fergan, 75 per cent. For other parts of Russia the figures are:—1-5 per cent. for St. Petersburg; 30-35 per cent. for the Government of Tambow; 50 per cent. for the province of the Don; 30-50 per cent. for the Government of Saratow; 30-60 per cent., according to both Mokrzecki and Portchinsky, for the Crimea; 85-95 per cent. for the Government of Astrachan. These figures are only approximate.

In the northern provinces of Russia, there is only one brood of *L. pomonella* in the year: in middle and south Russia, two more or less complete broods: while in Russian Turkestan there are three—two complete and one more or less partial, though considerable. In this region *L. pomonella* winters in the caterpillar stage, pupating in March and April, and the first imagos appear towards the end of the latter month. Oviposition starts at the beginning of May in the province of Samarkand and in the middle of May in and near Tashkent, reaching its height between 28th May and 7th June, and the first caterpillars appear at the end of May. There are very few moths in the middle of June, but from about the 24th June they increase again, reaching the maximum in the first week of July, and during the whole of July their number is enormous. The caterpillars of the second generation appear in the fruits during July and August; about half of them pupate and produce moths of the third brood, while the other half hibernate and pupate only in the next spring.

The author has experimented on the time the moths can live without food in captivity, and found the average period to be eight days, while single specimens lived much longer; 18, 20, 24 and 25 days. Moths kept warm during the winter showed remarkable longevity; one female lived 43 days, another 46, while the males lived for about 25 days.

Throughout May the average number of eggs laid by a single female is 75; in June and in July it is about 100; while in August it is much less. The author reports having obtained from single specimens exceptional quantities of eggs; thus in June 1911, one female laid 149 eggs, and in July 1912, some others laid 150 to 160, and one even 171 eggs.

With regard to the place of oviposition the statements of the Russian and American authors are at variance; for while in America the vast majority of the eggs are laid on leaves, in Russia they are found mostly on the fruit. In Turkestan oviposition takes place exclusively on the fruit; during two years of continuous observations the author found an egg on a leaf on two occasions only.

The author further describes in detail the life of the caterpillars from the date of hatching to pupation. He noted that about 75 per cent. of them pupate on the stem of the tree, while the remainder pupate either on the branches or inside the fruit. In the last chapter the factors which facilitate the dispersal of the codling moth are discussed.

Andrews (E. A.). **Entomologist's Notes.**—*Quarterly Jl., Sci. Dept., Indian Tea Assoc., Calcutta*, pt. 1, 1913, pp. 28-29.

Whilst investigating the "mosquito blight" in one of the districts of Cachar, the author was able to find *Helopeltis theivora* in all stages upon tea, not only upon that which had been lightly pruned, but amongst that also which had been collar-pruned, thus confirming Mr. Antram's statement that the insect lives upon the tea during the cold weather. The female bug appears to lay her eggs, as a rule, in the axils of the new buds and in the tiny shoots springing from the bottom of the bush. Thus the benefit of cleaning out the bushes for mosquito blight would appear to lie rather in the removal of shade than of eggs, although many young bugs are taken away with the prunings.

An interesting Mermithid parasite was discovered in Cachar. Its eggs are laid in the ground, and larvae emerge which bore into the body of the host. The larvae eventually leave the latter and pupate in damp soil. Little is as yet known of this parasite, but immature stages of apparently the same species were recorded from the Darjeeling district in 1904, and identified by Prof. Camerano as Mermithids. Since then it has been recorded from Sylhet.

Glasenapp (S.). ОПЫТЫ ОПРЫСКИВАНІЯ ЦВѢТУЩИХЪ ЯБЛОНЕЙ ТАБАЧНЫМЪ ОТВАРОМЪ [Spraying apple trees in blossom with tobacco extract].—ТРУДЫ БЮРО ПО ПРИКЛАДНОЙ БОТАНИКѢ [Memoirs of the Bureau of Applied Botany]. St. Petersburg, vi, no. 4, April 1913, pp. 243–250. (With German summary.)

The author made experiments in his orchards in the Luga district of the St. Petersburg Government, in order to test whether it is practicable to spray apple trees when in bloom without

damaging the fruit prospects. The trees selected (1911) had suffered from the ravages of *Psylla mali* and did not show very many blossoms. They were sprayed twice in one day with an extract of tobacco prepared by boiling 1 lb. of *Nicotiana rustica* for a quarter of an hour in 3 gallons of water, and then diluting with 6 gallons of water. The decoction was strained through a fine sieve and the trees and blossoms were sprayed with a Pomona spraying outfit. If it be assumed that *N. rustica* is of equal strength with *N. tabacum*, the author's extract was somewhat weaker (5 : 9) than that employed by U. Pickering and F. V. Theobald (1908). At the time of spraying, the blossoms were full-blown, and therefore all the *Psylla* were hatched. The double treatment was sufficient to destroy all the insects, or at least they could not be found after spraying. The apple crop was small and some of the fruit had an irregular shape, which was probably due to the *Psylla* damaging the flower-pedicels before spraying.

In 1912 the author repeated the experiments on a larger scale. Two sets each of 5 apple trees of the Antonovka variety, having a good show of blossom, were sprayed twice; the first time when the flower-buds were still unfolded, the second time when in full bloom. One set was sprayed with tobacco extract of the same strength as in the preceding year; the other set with an extract three times as concentrated (1 lb. of *N. rustica* in 3 gallons of water). In another orchard the author sprayed 50 trees in full bloom. In all cases the sprayed trees produced a fine crop of apples of good quality, whereas the unsprayed ones showed much stunted fruit owing to *Psylla* attack. The author is thus able to confirm Theobald's and Pickering's conclusions; further, the spraying did not interfere with the bees. The weak tobacco extract spray was quite sufficient to destroy *Psylla mali*, young caterpillars of *Cheimatobia brumata*, Tortricidae and similar pests.

Escherich (K.) & Baer (W.). **Tharandter Zoologische Miszellen.** [Zoological notes from Tharandt.]—*Naturw. Zeits. für Forst- und Landwirtschaft*, xi, no. 2, Feb. 1913, pp. 98-128, 5 figs., 1 pl.

Pachynematus montanus, Zadd.—Since 1908 pine trees in western Saxony have been increasingly damaged by this sawfly, the injury resembling somewhat the ravages made by *Nematus abietum*. There are, however, essential differences in the methods of attack, *N. abietum* feeding on the upper shoots of the current year, whereas the damage done by the new pine pest is restricted to the shoots of the preceding year and is yet more conspicuous on twigs three or four years old. The actual damage to the needles also differs according to the species. Whereas the larva of *N. abietum* starts its attack at the edge of the pine-needle and spares the harder parts, so that the point of the needle has the appearance of being suspended by a thread, the larva of *P. montanus* attacks the flat side of the needle, finally leaving the latter as a thin, transparent membrane. This method of feeding

may explain how it is that the latter species does not attack the young thick square needles. Owing to the absence of chlorophyll in the needles after they have been attacked the trees at first have a pale appearance, resembling the symptoms caused by *Tortrix* (*Asthenia*) *pygmaeana*. Later, when the remains of the needles are dried up, the injured trees assume an intense reddish colour, as do those attacked by *N. abietum*.

P. montanus emerges during May; females captured on 24th May oviposited 3 days after, and the larvae hatched between 7th and 9th of June. The laboratory records synchronised with the field records. At the end of June the larvae attain full size, and the majority spin their cocoons in the ground during the beginning of July, remaining there until the following year.

The damage was particularly severe in 'stands' of 40 to 70 year old trees in the forest ranges of Tharandt, Wendischcarsdorf, Werdau and Waldheim. It was found that bands of tanglefoot placed round the trees against the nun moth were occasionally completely covered with *P. montanus*, and that it was therefore advisable to make the bands considerably broader.

Lophyrus hercyniae, Htg.—The author knows of only one previous record of damage done to pine trees by this insect, namely a not very serious infestation of hedges along a railway line near München. Lately, a severe but localised attack in the State forest range of Untertriebel (Saxony) would have assumed alarming proportions had it not been controlled by the energetic measures taken by the authorities. In 1908, the first serious infestation occurred, and about 70,000 larvae were collected between the 6th and 20th October and destroyed. In July 1909, numerous cocoons were also found, and from 2nd August till 4th September 8,740 larvae and 57,800 cocoons were collected. In the first fortnight of October only a few larvae and about 700 cocoons could be found in the infested area (5 acres).

Only a single egg is deposited in each pine-needle. Contrary to a frequently made assertion that sawfly eggs only develop in living plants, the authors were able to breed out larvae from twigs taken to the laboratory. The older larvae of *L. hercyniae* attack the pine-needles by eating them to their base without leaving any remains, as is so characteristic of other species. The cocoons are to a large extent fixed to the pine-needles on the twigs, and are thus liable to be destroyed by birds. During the winter, cocoons of this species were found among the stomach contents of *Parus cristatus* and *Regulus regulus*.

Usually *L. hercyniae* has two generations in one year. The adults emerge in April and sometimes are on the wing until the beginning of June. The chief season for damage to pine trees is June and the beginning of July. The second generation appears after a very short period of pupation, depending largely on climatic conditions; but frequently the two generations overlap or the second may be partly suppressed.

Hepialus humuli, L.—An addition to the large food list of this insect, previously known as a hop pest, is the hickory tree (*Carya alba*). At Hubertusburg, in 1912, hickory roots were

found to have been tunnelled by the caterpillars, the thinner ends of the roots frequently being completely excavated. So far, the damage has not been very serious, in one nursery only 2 per cent. of the young hickory trees being infested without noticeable ill-effects. The softness of the roots explains why the hickory tree has become a food-plant of an insect usually favouring herbaceous plants.

Ergates faber, L.—In Prinkenau lamp-poles and fence-posts of pine wood, some even painted with carbolineum, were found to be infested with the larvae, pupae and imagines of this Longicorn. It was seen from a sample of damaged wood that the peripheral parts had been spared whereas the sapwood had been tunnelled through and through, the heartwood again being left untouched.

Palaeococcus fuscipennis (Brm.).—In 1911 this reddish scale occurred in large numbers in Reudnitz (Saxony) and frequently completely covered tanglefoot bands round pine trees. In these colonies larvae of a beetle were found, which in colour and general appearance closely resemble the scale. These larvae proved to be the Coccinellid, *Novius cruentatus*, which prevents the scale from becoming a very serious pest.

The author also gives an account of other insects found on tanglefoot bands.

Escherich (Prof. K.). **Fortschritte der Leimtechnik.** [Progress in the art of applying tanglefoot.]—*Tharandt. forstliches Jahrbuch*, lxiv, 1913, pp. 78-88, 4 figs.

The disastrous occurrence of the nun moth in Saxony has led to the banding of the trees with tanglefoot in more than 50,000 acres of State forests. The application of tanglefoot on so large a scale necessitated the use of special apparatus, Cyrus', Ringler's and Janke's tanglefoot squirts being employed. The latter has proved to be the best, for with this it is possible to band the tree with greater ease and at a greater distance from the ground.

A striking example of the advantage of 'high banding' was afforded by the Leipzig University forest near Oberholz, where the 'low banding' had retained its adhesive properties for more than a year. Below these bands, as well as below those 10 feet higher up the tree, dense rings of 'tents' showed that if the 'high banding' had not been resorted to countless caterpillars would have ascended to and defoliated the tree-tops. 'High banding' is by no means a more costly process than 'low banding'; 58 trees on an area of 120 square yards were banded by 4 men in 15 minutes, which equals 0·5 pfennigs per tree (4*s.* 10*d.* per 1,000 trees) for wages (30 pfennigs per hour).

Instead of banding the trees, special ropes treated with tanglefoot were coiled round the trunk by a whip-like action of the operator. A special apparatus to enable the prepared rope to be whipped round the trunk at some height from the ground proved to be unreliable for many reasons. The best method of high banding now known is for the operator to stand on a ladder and apply the tanglefoot with the squirt mentioned above.

Ehrhorn (E. M.). **Report of the Division of Entomology, Territory of Hawaii, for the Biennial Period ending 31st December 1912.** Honolulu, 1913, 120 pp.

The author considers soil attached to the roots of imported plants as specially dangerous; grubs of *Anomala orientalis* which attacks the roots of sugar-cane have been found in it, and various species of lepidopterous larvae have been found crawling over the outsides of packing cases, including larvae of *Lymantria dispar* from Japan. All fruits and vegetables found in the baggage of immigrants are destroyed and replaced by island products.

An account is given of the injurious insects and diseases intercepted upon entry into the Territory, with details as to the character of the insect and the plants and places with which it is connected. The list comprises 8 Orthoptera, 4 Heteroptera, 37 Homoptera (of which 30 were scale-insects), 1 Thrips, 23 Coleoptera, 5 Diptera, 20 Lepidoptera, 1 Hymenopteron and 27 ants.

The author states that the appearance in Oahu of *Ceratitis capitata*, the larva and pupa of which may be carried in the soil attached to plants, led to a prohibition of the export of plants and soil, as well as fruit, to the other Hawaiian islands, unless declared free from pests. He advises greater vigilance to prevent exportation of fruit in small packages by individuals.

A record kept of the fruits and vegetables attacked in Hawaii by *C. capitata* includes, strawberry guava, avocado pear, guava, sweet and sour orange, Chinese plum (*Voronhia emarginata*), ripe papayas, Chinese ink-berry (*Cestrum*), kawani seeds, prickly pear (*Opuntia tuna*), loquats (*Citrus japonica*), a species of *Eugenia*, mock orange (*Murraya exotica*), the Jamaica damson plum (*Chrysophyllum oliviforme*), peach, Chinese orange, green peppers, squash, figs, rose apple, star apple, mountain apple, coffee berries, mango, grape fruit, Natal plum (*Carissa arduina*), limes and *Carambola*. The supposed enormous propagation of the insect on the wild guava was not borne out, the average proving to be less than 1½ flies per fruit. The fly has reached all the large islands except Lanai, and in Hawaii the Hilo, Puna, and Kau districts are still immune.

The threat of the Californian authorities to refuse all shipments of fruit, and especially of bananas, from the Hawaiian Islands has led to legislation enabling the pests complained of to be dealt with. Packings of Hilo grass, which introduces the pupa of *Ceratitis capitata* and of old dried banana leaves, infested with *Hemichionaspis minor* and *Chrysomphalus aonidum*, were discarded; old stumps, dried leaves and rubbish covered with these scales and with *Pseudococcus bromeliae*, which is carried by the ant *Pheidole megacephala* from them to the young growth, were cleaned up in certain plantations and along the roads, and many old fields were even wholly uprooted and replanted.

Gelechia gossypiella (the Pink Cotton Boll-worm) has been greatly reduced by the application of the law laid down against the banana pests. The cotton in certain abandoned fields full

of small bolls was uprooted and the destruction of the breeding ground soon materially decreased the percentage of infested bolls in the neighbourhood.

A number of extracts from official regulations as to fruits and plant traffic are given at the end of the report.

Dr. T. **La Punaise des Blés.** [The Wheat Bug.] — *Bulletin Agricole de l'Algérie et de la Tunisie, Algiers,* xix, no. 12, 15th June 1913, pp. 257, 258, 1 fig.

Ælia germari var. *cognata* is a bug which on the upper Algerian table-lands periodically does much damage to wheat by sucking the young ears; it was first noticed in 1886, and is locally called "umm tebagh."

Æ. germari is fairly common in Spain, the South of France, and Italy, but it does not seem to attack cereals to any extent there. The Algerian variety, too, normally lives upon wild grasses, and it is only under certain conditions that it attacks cereals. It quickly empties the young corn and lays its eggs on the ears. The young are hatched five or six days later, and immediately begin to suck the ears within their reach. The insect reaches its adult state within a month. When fully formed corn is attacked the insect deprives it of the whole of the gluten. The grain becomes thin, shrivelled, almost empty, easily broken with the nail, and not compressible by the hand, whitish and dull; it contains water, 12·80 per cent.; acidity, 0·2175; sugar, 2·83; gluten, 0 per cent. In May and June of this year the "umm tebagh" extensively invaded the Tiaret region. Its biology is not sufficiently known for it to be effectually resisted, for, like the "douda," it has been too long neglected, owing to the want of scientific organisation in the agricultural services.

Bladluizen [Aphides]. **Schildluizen** [Coccidae].—*Vlugblad, Nos.* 1 & 2, *Instituut voor Phytopathologie, Wageningen,* June 1913.

In these popular leaflets it is recommended to treat infested shrubs and trees with an 8-10 per cent. solution of carbolineum, especially in the case of Coniferae, applied with an atomiser.

Van Poeteren (N.). **Carbolineum als bestrijdingsmiddel tegen schadelijke dieren.** [Carbolineum, a remedy against pests.] —*Tijdschrift over Plantenziekten, Wageningen,* xviii, nos. 5 & 6, 1912, pp. 132-148; xix, no. 1, 1913, pp. 12-38.

The usefulness of carbolineum in horticulture has been previously discussed by J. Ritzema Bos (Tijds. over Pl., 1908, pp. 15-46) and by E. Molz (Centralbl. Bakter., ii, Abt., xxx, 1911, pp. 181-232), and the composition of various brands of carbolineum by S. C. J. Olivier (Chem. Weekblad, 1908, no. 6).

The results published in these papers have led Mr. van Poeteren to a detailed re-examination of the question, and his conclusions are grouped under six headings:—Against which insects is carbolineum effective; which plants may be sprayed; time of spraying; influence of carbolineum on plants; emulsified and non-emulsified carbolineum; spraying methods.

Some brands of carbolineum are very effective as insecticides and fungicides, and deciduous as well as a few evergreen woody plants do not suffer from carbolineum emulsions; these however ought not to be applied stronger than 6-10 per cent. Spraying should be undertaken at the end of winter, evergreens at the latest on 15th March, deciduous shrubs and trees two or three weeks later. The detrimental effect of carbolineum frequently noticeable in the buds after spraying, is negligeable, provided the spray be not applied too late, nor in too concentrated a solution. The advantage gained by destroying the pests is generally greater than any injury done to the plant by spraying. The spray should be applied with an atomizer.

Schoevers (T. A. C.). **Eenige pogingen tot bestrijding van schadelijke insecten door middel hunner natuurlijke vijanden.** [Some attempts to control injurious insects by means of their natural enemies.] — *Tijdschrift over Plantenziekten*, xix, 1913, no. 3, pp. 91-96; no. 4, pp. 109-130.

A detailed discussion of the subject and a useful summary of the experimental work of Howard, Fiske, Froggatt, Quanjer, de Bussy, Compère and others.

Coccids of the Laurel.—*Jl. Soc. Nat. d'Horticulture de France*, xiv, July 1913, p. 417.

At a meeting of the Society held on 26th June 1913, M. Clement exhibited leaves of *Laurus nobilis* covered with *Lecanium lauri* and remarked that this species so closely resembled *L. hesperidum* that many authors, amongst others Signoret, did not regard it as a valid species but considered the two to be identical. He also exhibited a number of leaves of the Red Laurel attacked by *Aspidiotus nerii*. He says that both species can be destroyed by the ordinary methods used against scale-insects and that immersion gives excellent results. At the same meeting M. Pinelle reported the results of experiments made with an insecticide called "Guerbal" against the Woolly Aphis; 12 lb. of this mixed with soap and made up with 20 gallons of water was used as a spray, and a few hours afterwards it was found that all the aphids which has been touched by the liquid were dead. No burning of the leaves was observed. The treatment should be repeated two or three days later. The interest of the experiments lies in the fact that this particular insecticide does not damage young wood. No information was given as to the composition or cost of the preparation.

Stoward (F.). **The Insensitivity of the life-forms of the Potato Moth to various Poisons.**—*Australasian Assn. for the Advancement of Science, Melbourne*, 1913.

One of the most troublesome insect pests which ravage the potato crops of the Commonwealth is the Potato Moth (*Phthorimæa operculella*), and the author gives an account of various experiments undertaken for the purpose either of preventing infestation of sound stored tubers, or of effecting the destruction of the larvæ, pupæ and eggs in or on tubers already infested.

He found that the immersion of infested tubers in solutions of formalin, mercuric chloride, copper sulphate and sulphuric acid was of very doubtful value; for the length of the immersion or the strength of the solution necessary to kill the insects involved extensive injury to the tubers. Similarly, the coating of the tubers (either by immersion or spraying) with mercuric chloride, lead arsenate, copper-soda mixture, lime-sulphur or Paris green, is stated to be ineffective as a means of permanently preventing infestation; for observation tended to show that the larvæ did not ingest any material until they had penetrated into the starchy tissue of the potatoes.

The only satisfactory results were obtained by fumigation with carbon bisulphide. Experimental trial over a considerable range of conditions has shown that the larva, whether in the substance of the tuber or isolated from it, succumbs after 15 to 16 hours' exposure to an atmosphere containing this compound in the proportion of 1 to 2 lb. per 1,000 cubic feet of air. It requires, however, at least 48 hours' fumigation at either of the above rates to destroy the pupa, and a single application under these conditions does not invariably suffice. In the majority of the experiments the eggs succumbed to a single fumigation of 48 hours' duration; a second fumigation should be applied 6 to 8 days after the first.

Experimental investigation has shown that commercially sound unsprouted tubers may be subjected to intermittent fumigation with carbon bisulphide (1 to 2 lb. per 1,000 cubic feet of space) 2, 3, or even 4 times without producing serious damage to the tuber buds, if each fumigation is limited to a period of 48 hours' duration. Tubers fumigated intermittently under the above-mentioned conditions and subsequently stored in a dry, airy, place for periods of from 2 to 3 months, have, on planting, yielded quite as good crop results as similar, but unfumigated, control tubers.

Wireworm.—*Jl. Dept. Agric. and Tech. Instruction, Ireland*, xiii, no. 4, July 1913, pp. 761-763, 2 figs.

The department draws attention to the fact that preventive measures against wireworm are far more efficacious than remedies and that the best safeguard against the pest is thorough cultivation and appropriate manuring.

The pasture cannot be ploughed too early. Have it eaten short, and so soon as it ceases to benefit stock, plough it down.

Plough with a good strong furrow; use a skim coulter, to make sure of burying all with the sod; and use a tailpiece to the mouldboard to ensure that the furrow is well broken. By ploughing early with a well-broken furrow, rapid and more thorough decay is induced, and the wireworms are subjected to a long period of starvation till the next crop is sown. For the same reason the grain stubble should also be ploughed early, and, while the land is in roots, the opportunity should be taken to clean it thoroughly of weeds, as not only are they a hindrance to the root crop, but such of them as survive are so much winter food for wireworm.

In spring the chief aim must be to obtain a vigorous young growth of shoots that will be resistant to wireworm and grow quickly beyond the stage at which they are most easily injured. Such a growth is best secured by having a well prepared seed bed, by not sowing too early, and by judicious manuring. When there is a likelihood of a crop of lea oats being attacked by wireworm the application of the following mixture of artificial manures is strongly recommended:—1 cwt. sulphate of ammonia, 3 cwts. superphosphate, 3 cwts. Kainit per acre.

The use of this dressing involves some outlay, but it must be borne in mind that its application is calculated to produce not only a vigorous initial growth resistant to wireworm, but also an increased yield of superior quality grain; further, the corn will ripen earlier and be ready for cutting sooner than would otherwise be the case.

Where wireworms are feared, the first grain crop sown after pasture should be a strongly "tillering" variety, such as Potato oat, and oats which do not tiller freely should on no account be sown.

When a wheat crop is being damaged by wireworm, remedial measures are not very satisfactory. Some good may be done at times, however, by heavy rolling and by a top dressing of 1 cwt. nitrate of soda per acre.

Birds which follow the plough, especially starlings, gulls, and lapwings do great service by eating wireworm, and they should be protected and encouraged.

Dressings of lime, gas lime, salt, rape meal, &c., have been frequently recommended as preventives of wireworm attack, there is, however, little direct evidence that they serve this purpose, and the Department consider that it is unwise to rely too much on such remedies.

Pratt (H. C.). **General Notes concerning Locusts.**—*The Agricultural Bulletin of the Federated Malay States, Singapore*, vol. i, no. 12, July 1913, pp. 428-430.

Large numbers of *Pachytylus danicus* having appeared somewhat suddenly in the Federated Malay States, the author gives a short account of their habits and concludes with the suggestion that planters and others in various parts of the States should assist the Department of Agriculture by reporting breeding-grounds and the appearance of the young.

Insectes nuisibles dans la Province (Quebec). Le "San José Scale." [Injurious Insects in the Province (of Quebec). The San José Scale.]—*Le Naturaliste Canadien, Quebec,* xl, no. 1, July 1913, pp. 8-12.

Aspidiotus perniciosus, called in English the San José Scale and in French the Kermès San José, has just been observed for the first time in the Province of Quebec, where it was found on the bark of a young *Sorbus americana* (Service-tree, Maskuabina), in a garden at Sainte-Anne de Bellevue. The plant appears to have come from a nursery in Ontario.

Schultz (C. H.). **The Italian Bees at Alabang, Rizal.**—*Philippine Agricultural Review, Manila,* vi, no. 7, July 1913, pp. 335-339, 1 fig.

The author tells the story of two hives of imported Italian bees sent to Alabang at the end of November 1912. Red and white ants were kept from the hives by a gutter filled with water, and they were not troubled by other parasites. One hive contained a queen bee, the other had been without one from about the 10th of November. In this two frames containing young brood and eggs were placed on the 4th of December and on the 23rd a young queen was introduced by Pond-Simmin's method. She flew out several times, and on the 21st of January began to deposit eggs. The old queen was protected, and on the 10th of April the first males of the season were obtained from eggs laid by her. Besides her hive and that of the young queen, there are two nucleus hives with virgin queens, drones and workers in abundance, all being in a thriving condition: so that the question whether Italian bees can be propagated has been answered in the affirmative.

Legge per prevenire e combattere le malattie delle piante. [An Act to prevent and control Plant Disease.]—*Atti Parlamentari, Camera dei Deputati* (No. 1430-1430A), *Senato del Regno* No. 1142-1142A), *Rome,* 1913.

The following measures with regard to the diseases of plants are prescribed by the Italian law enacted in June, 1913.

"Art. 1.—The owners and managers of horticultural establishments and nurseries, who produce or trade in plants, parts of plants, and seeds, must notify themselves to the prefect of the province.

"The Ministry of Agriculture, Industry and Commerce has the right to cause an inspection to be made of the cultivations and of the produce, wherever they be kept, and to prohibit their sale if they should be found to be infected, or to order the necessary disinfection.

"Art. 2.—The Ministry of Agriculture, Industry and Commerce may, by means of a ministerial decree:—

"(*a*) suspend the importation into the Kingdom and the transit through it of plants or plant products, if these be found to be infected;

"(*b*) determine the ports and the frontier stations through which alone the importation from abroad of living plants, seeds and other plant products shall be allowed;

"(*c*) prevent the exportation of plants, parts of plants and seeds from the territory of communes in which the existence of infectious diseases has been ascertained.

"Art. 3.—The inspectors of the Ministry at the ports and frontier stations have the right to:—

"(*a*) enforce the disinfection of plants, parts of plants and seeds which they may consider infected, as well as of the packing cases and any other object which may be a vehicle of disease germs;

"(*b*) prohibit the importation into the Kingdom, and transit through it, of plants which they consider infected or bearing germs of disease."

Other articles deal with compensation, the power to enforce the use of remedies, the formation of associations, penalties, &c.

CIMATTI (V.). **Le cocciniglie e i pidocchi degli agrumi, olivo e fico.** [The coccids and lice of citrus plants, the olive and the fig.] —*Rivista di Agricoltura, Parma,* xix, no. 30, 25th July 1913, pp. 468, 469.

The writer states that the Bianca-rossa (*Chrysomphalus dictyospermi variopinnulifera*), the Bianca (*Aspidiotus hederae*), the Pidocchio (*Lepidosaphes beckii*), the Pidocchio nero (*Parlatoria zizyphi*) the Bianca dell'ulivo (*Aspidiotus betulae*) and the Rugna of citrus plants and the olive (*Saissetia oleae*), which appear on these trees and on the fig in March, June, August and October, should be sprayed with polysulphides of lime, as soon as the leaves show a large number of little reddish brown, white, or black circles. The spraying should be done in such a manner as to form, as far as possible, a uniform white layer on the leaves. In the first year the process should be repeated for each generation of the insects, and if the infection is severe it is advisable to spray the trees both upwards and downwards. From 10 to 35 litres, or an average of 20 litres per tree are required. The best time to combat the Rugna is when, at the beginning of June and the end of August, small red insects are observed on placing the infested branches of citrus or olive trees on white paper under an inverted glass.

I sali di arsenico in viticoltura ed in agricoltura. [Salts of arsenic in vine-growing and in agriculture.]—*Rivista di Agricoltura, Parma,* xix, no. 32, 8th August 1913, p. 499.

In a report to the Sanitary Authority by Professors G. Ampola and S. Tommasi the objections to the use of arsenical salts as insecticides are thus enumerated. Their free purchase may be the cause of crime; they may, in the hands of unskilled workmen, cause accidental poisoning; the arsenic carried from the fields

and gardens into damp dwellings on boots and clothing may cause arsenical mildew, emitting poisonous gases, and may, in the same way, poison articles of food and other products in shops; useful insects and game, and even honey, may be rendered poisonous: as much as 2 mg. per kilo of fruit and 1 mg. per litre of wine is found where arsenical compounds have been used, and continued use of such products may be deleterious; the grass under the plants sprayed may poison domestic animals, and rabbits, birds and snails, though themselves immune, may transmit the poison; and the accumulation of arsenic in the ground might injure vegetation, especially woody plants, and render their fruits dangerous.

Report on the Forest Administration of the Central Provinces for the year 1911-1912.—*Indian Forester*, xxxiv, no. 8, August 1913, p. 388.

The borer, *Hoplocerambyx spinicornis*, has done considerable damage to the Sal in Mandla, and further information as to whether it attacks healthy trees or only weaklings is required. Mr. Haines notes that opening out the cover appears to favour the pest, so that too free cutting out of the infected trees appears to increase the damage. Mention is also made of *Cyrtotrachelus longipes*, F., which has appearently been damaging bamboo shoots in Sangor.

Britton (W. E.). **The Apple-Tree Tent-Caterpillar**, *Malacosoma (Clisiocampa) americana*, **Fabr.**—*Bull.* 177, *Connecticut Agric. Exper. Stat., New Haven, Conn.*, August 1913, 20 pp., 16 figs.

This bulletin, rewritten from Bulletin 139 (1902), was issued owing to the unusual abundance in Connecticut in 1913 of *Malacosoma americana*, the outbreak covering the entire State, except for certain localities along the coast. In ordinary seasons the caterpillars feed upon several species of wild cherry and do little harm in the orchard, though trees along roads and in hedge-rows may be attacked. Nevertheless, when abundant, as at present, many apple trees are defoliated. Cherry, apple, plum, peach, rose, witch-hazel, beech, barberry, oak, willow, poplar, and birch are mentioned as food-plants. A brief account is given of the life-history, and points of difference from its congeners.

Much can be done in the winter months to destroy the egg-masses. When the trees are bare these can be easily seen near the ends of the twigs and can be clipped off by means of a long-handled tree-pruner. Removing the nests with a special brush is also effective, the brush being made of stiff bristles twisted in heavy wire and trimmed to the shape of a cone about six inches long. The author does not recommend burning, because there is danger of severe injury to the tree. For spraying, 3 lb. of lead arsenate or ½ lb. Paris green should be used for each 50 gallons

of water, or the same quantity of Bordeaux mixture. Where Paris green is used without Bordeaux mixture, 3 lb. of fresh lime to one of poison should be used to prevent burning the leaves. An instance is given of the advantage of offering prizes to school children for collecting the egg-clusters of the pest. In Newfields, N.H., where they were offered 10 cents per 100 clusters, 8,250 egg-masses were collected; and if each cluster contained 150 eggs, which is a small average, 1,237,500 eggs were destroyed at a cost of $8.25. An interesting contest in Newtown, Conn., resulted in school children gathering 16,864 nests, weighing 1,300 lb., which were subsequently burned.

Blais (Max). **Les Insectes et le Froid.** [Effect of cold on insects.] — *Le Moniteur d'Horticulture, Paris,* no. 16, 25th August 1913, pp. 184, 185.

The author draws attention to the common belief that winter frosts destroy insects and that if they fail insect pests may be expected to be very numerous. He says that this is little better than a superstition, and that while frost, particularly if sudden, is effective in destroying slugs and snails, insects are by no means seriously affected even by severe cold. Various instances are cited in support of this statement, and the author says that the only practical effect of cold is to delay somewhat the life processes of the insects. On the other hand a mild winter, far from being an indication of a severe outbreak of pests, rather tends to their diminution.

Sannino (F. A.). **Un nuovo rimedio contro la filossera.** [A new remedy against Phylloxera.]—*Rivista di Viticoltura, Conegliano,* xix, ser. 5, no. 16, 15th Aug. 1913, pp. 363, 364.

Prof. Sannino expresses scepticism with regard to a story, going the round of the Italian newspapers in July, to the effect that the planting of tomatoes in a Phylloxera-ridden vineyard had given a new lease of life to the dying vines, that the roots of the tomato plants were found to be loaded with dead insects, and that this was due to the solanin contained in the tomato. He thinks the vigour of the vines may have been increased by manuring the tomatoes, or by irrigation, which may at the same time have killed some of the insects; but he is of opinion that these effects, as also the benefit of sandy soil, which favours the vine and retards the multiplication of the pest, cannot be lasting, and that the Phylloxera always triumphs eventually.

Carcano (C.). **Conservazione del frumento.** [The preservation of wheat.]—*Rivista di Viticoltura, Conegliano,* xix, ser. 5, no. 16, 15th August 1913, p. 381.

This note counsels the whitewashing of the ceiling and sides of granaries, before wheat is stored in them, with milk of lime

and the washing of the pavement with ash-lye or a solution of potash. Sulphur (30 grammes per cubic metre) should also be burned in the granary, which should be kept closed for two or three days and then left open until storage. For certain pests, such as weevils and moths, it is further advisable to put wide-mouthed vessels containing sulphide of carbon (15 to 20 grammes per 100 kilogs.) into the wheat, when it is from 50 to 75 centimetres high in the granary, covering it up with canvas and keeping the granary hermetically closed for five or six days; the fumes will destroy every insect in the wheat. When the cloths are afterwards removed, ordinary ventilation will free it from all smell left by the sulphide.

KELL (D.). **Some field notes on a soft grey scale known locally as the "Longulus" scale.**—*Mthly. Bull. State Commission of Horticulture, Sacramento*, ii, no. 8, August 1913, pp. 617-619.

This scale is as yet undetermined. It frequents orange trees in various parts of California, including the Claremont and Pomona district. It bears some resemblance to *Coccus hesperidum*, but is less fostered by ants, grows to a larger size, is more grey, less shiny, and the more transparent young lie flatter, as a mere film, on the leaf. It is practically viviparous, though eggs are occasionally found among the larvæ, of which there may be as many as 500 under one scale. The hatch lasts from the beginning of May to about the 21st of August, and after this the mother scales, then formed almost wholly on the smaller twigs, become dry, turn light brown and fall off, leaving whitish marks. The smut from the honeydew secreted soils Valencia oranges a great deal, but the navels are picked too early to suffer. The author tabulates the effects obtained by fumigating 57 trees with sodium cyanide, according to the Woglum system. The results were not uniform, but they point to the possibility of obtaining a fair killing between about the 20th of July and the end of August, a three-quarter dosage being sufficient, and the 57 trees were, at the time of writing, fairly free from both "longulus" and black scale, of which there was much on the surrounding trees.

SMITH (H. S.). **A Bill-Bug injurious to small grain** (*Sphenophorus discolor*, Mann.).—*Mthly. Bull. State Commission of Hortic., Sacramento*, ii, no. 8, Aug. 1913, pp. 619-621., 2 figs.

The beetle mentioned by the author appears to breed in the roots of *Scirpus lacustris*, and it has been doing considerable damage to barley, wheat and oats grown on land in California reclaimed from this bulrush; the destruction of which, it is anticipated, will deprive the insect of a breeding place and cause its disappearance. It commonly clings head downward to the stalk of the grain, inserts its proboscis through that part

of the stem known as the boot, and entirely severs the main stalk bearing the head. The heads turn white and the kernels fail to develop.

Weldon (G. P.). **The Codling Moth** (*Carpocapsa pomonella*, Linn.).—*Mthly. Bull. State Commission of Hortic., Sacramento*, ii, no. 8, Aug. 1913, pp. 619-621, 2 figs.

The author suggests that when the crop is light, and more insects have to share the available fruit amongst them, the calyx application of lead arsenate, or any other good arsenical spray, must be made before the calyx cups close, which is scarcely more than a week after the apple petals fall, but longer with pears, some of which never close the calyx entirely. This, at any rate in the case of the apple, will kill all larvæ trying to enter at the calyx end, as most of them did this year, throughout the season.

Essig (E. O.). **The Manzanita Serica** (*Serica anthracina*, Lec.). —*Mthly. Bull. State Commission of Hortic., Sacramento*, ii, no. 8, Aug. 1913, pp. 622-623, 1 fig.

This beetle feeds on the manzanita, black oak, lupines and *Ceanothus* sp. Apparently owing to shortage of green wild plants brought about by the drought, it has this year attacked orchard trees, especially the prune and apple, in Bowman, Placer County; Nevada City, Nevada County; Placerville, El Dorado County; Inyo County and Fresno County—all in California. It eats the leaves to the stem, sometimes killing the trees by completely defoliating them. If the plant be ever so lightly touched, or even if the beetle perceives the approach of anyone, it drops to the ground and secretes itself. The best remedy is a spray of 8 lb. lead arsenate, 8 lb. lime and 100 galls. water, with which the tender tips and twigs should be liberally drenched as soon as the insects appear in spring, repeated applications being resorted to in order to ensure thorough protection.

Essig (E. O.). **The Prune Aphis** (*Aphis prunifoliae*, Fitch.).— *Mthly. Bull. State Commission of Hortic., Sacramento*, ii, no. 8, Aug. 1913, p. 624, 1 fig.

This aphis, the author states, has appeared in many prune-growing sections of the Sacramento Valley. It attacks the tips of the twigs and its very large colonies collect more especially on the under sides of the leaves, which they curl slightly. On the 10th May last, Syrphid flies and internal hymenopterous parasites promised to subdue the pest in Yolo County, but in other places a coarse spray of nicotin sulphate, in the proportion of 1 to 1500, has had to be forced at high pressure through the rather thick coating of fine white waxy powder secreted by the insect, in order to destroy it.

Essig (E. O.). **The Destructive Eleodes** (*Eleodes omissa* var. *borealis*, Blaisd.).—*Mthly. Bull. State Commission of Hortic., Sacramento*, ii, no. 8, Aug. 1913, p. 627, 1 fig.

This Tenebrionid has done much damage to orange trees around Bakersfield and has stripped a number of apricot and plum trees in Wasco, both of which places are in Kern County. The *Eleodes*, which was so thick as to cover the ground, also severely injured the watermelon vines. It is highly resistant to sprays, and poisoned bran is equally unsatisfactory, as the insects prefer plant food. Its unusually great multiplication is attributed to the very dry season.

Ritzema Bos (J.). **Plantenziekten door dieren veroorzaakt.** [Plant diseases caused by animals.]—*Mededeelingen van de Rijks Hoogere Land-, Tuin- en Boschbouwschool, Wageningen*, vi, no. 3, 1913, pp. 133-158.

This paper contains information on noxious insects sent to the Wageningen Agricultural College in 1911. *Silpha atrata* attacked beet in Ettelsbrück (Luxemburg), and it seems that the larvae prefer soil fertilised with potassium salts; Paris green is an efficient check. *Lyctus canaliculatus* bored timber and furniture at Klundert (N. Brabant). The injection of benzol or carbon bisulphide into the boreholes will kill the larvae. *Meligethes aeneus* is a pest of seed cabbages near Haarlem; spraying with Paris green before the plants are in blossom is recommended, but the presence of other food-plants in the neighbourhood makes control difficult. *Phyllobius calcaratus* attacked the bark layer of raspberry shoots at Enschede, and also damages alder, birch, willow and hazel. *Otiorrhynchus singularis* (*picipes*) defoliated horseradish at Uden (N. Brabant), and *O. sulcatus*, yew, rhododendron and laurel at Rotterdam. At Boskop the latter is known as the Yew beetle. *Ceutorhynchus assimilis* is a serious pest of cabbage sprouts near Breda, but little can be done against them except spraying with Paris green. *Eccoptogaster rugulosus* was received with damaged plum-twigs from Serajevo (Bosnia). *Bruchus pisi* was common at Wageningen and throughout Holland in 1911 owing to the dry warm weather. *Phratora vitellinae* is a pest of osier-willow at Haarlem, and it is advisable to spray the underside of the leaves with Paris green.

Cossus cossus infested nurseries at Baarle-Nassau and Opheusden; where the damage is not too great the larvae may be killed in the trees with carbon bisulphide, and the bore-holes subsequently stopped with clay. *Lymantria monacha* practically defoliated 750 acres of fir woods near Rosendaal (Gelderland). In certain parts the caterpillars were decimated by flacherie. *Tropicoris rufipes* was found at Kootwijk (Gelderland) to destroy the pupae of the nun-moth. *Phlogophora meticulosa* infested strawberry plants at Alkmaar from May to October. Two, and perhaps three, generations occur annually and the number of host plants is great. *Cheimatobia brumata* was found to be very

destructive in Delden, Dirksland, Maurik and Opheusden, the caterpillars chiefly infesting apple and cherry trees; banding the trees with tanglefoot is recommended. *Rhyacionia buoliana* was destructive to firs at Meyel (Limburg), and *R. resinella* did similar damage at Hilversum. *Tortrix murinana* damaged spruce at Ubbergen. *Eucosma tedella* occurred on *Picea excelsa* in the neighbourhood of Groningen. The needles became brown and died, but the trees generally recovered the following year. It was noticed that trees standing in shady spots were preferred by the pest. *Leucoptera scitella* mined apple leaves at Koudekerke and was found on different fruit trees at Breda. *Acrolepia betulella* was a pest of leeks and onions at Wageningen, Breda and Gouda.

Cecidomyia rosaria infested osiers at Ommeren. *C. brassicae* together with *Ceuthorrhynchus assimilis* damaged cabbage sprouts at Breda, and seed cabbage at Haarlem. *C. saliciperda* was a pest of willow at Voorthuizen, but can be checked with tanglefoot. *C. piricola* caused immature pears to fall at Wilhelminadorp, Rockanje, Oyen and Wilp. All windfalls should be collected. *C.* (*Monarthropalpus*) *buxi* mined box leaves at De Bildt (Utrecht). This is the first recorded appearance of this pest in Holland. *Anthomyia antiqua* infested shalot in Osterhout and Amsterdam, and leek at Breda. *A. brassicae* damaged cabbage roots at Nieuwer Amstel, Deventer, Amersfoort, Bornegiekerk, Wagenborgen and Sittard. *A. coarctata* infested winter wheat at Andel and Zuurdijk; not much can be done against this pest except early sowing and encouragement of growth with nitrates. *A. conformis* was mining beet leaves in Veendam, Winterswijk and Utrecht. *Merodon equestris* infested narcissus bulbs from different flower-bulb growing districts. *Oscinis frit* was reported as having imperilled the oat crop at Herwen, and it is advisable to resort to early sowing if this pest is numerous. *Hydrellia grisella* mined barley leaves at Groningen, but was not a serious pest; it has also been recorded from oats and rye-grass.

Hylotoma rosae was reported from Breda, Heemstede and Zuylen, where it damaged roses, the larvae injuring the leaves in July, the adult cutting the young shoots in August, and the larvae of the second generation injuring the leaves in September and October; Paris green and lime-water (1 : 1,000) is suggested as a spray. *Cladius viminalis* infested a whole avenue of young poplars at Laren. *Nematus septentrionalis* completely defoliated an alder hedge at Assel, and also occurred on birch, willow, poplar, &c. *N. ventricosus* did serious damage to currants at Borne, Wapenveld and Ubbergen. *Eriocampoides aethiops* skeletonised rose leaves at Dedemsvaart, Zuylen and Wapenveld. American insect powder is recommended against this as well as the last-named pest. *Hoplocampa testudinea* attacked young pears in Wilhelminadorp and apples in Heenvliet, causing them to fall prematurely.

Aphis padi, usually met with on *Prunus padus*, swarmed on apple trees in several localities. *Chermes pini* was recorded from several places on *Picea orientalis* and *P. excelsa*.

Macdougall (R. S.). **Insect Pests in Scotland in 1912.**—*Trans. Highland & Agric. Soc. of Scotland*, 1913, reprint, 17 pp., 9 figs.

The author prefaces his survey by recalling the fact that a spray of 1 part nicotin in 400 of water kills larvae and newly formed pupae of the chrysanthemum leaf-miner, which also attacks marguerites, and 1 in 200 kills pupae of all ages; the American "Black Leaf 40," a concentrated solution of nicotin sulphate, is very effective.

Phorbia brassicae (the cabbage-root fly) attacks cabbage, cauliflower, turnips, swedes, garden plants and Cruciferous weeds. The larvae tunnel in turnip and swede leaf-stalks and have also been found in cabbage leaves, but they generally infest the roots, emerging from eggs laid close to the plant in cracks in the soil, or on the stem below the surface. Pupation takes place in the soil or in the plant, the first flies appear about the end of April, and a later brood carries laying on to the autumn. Seedlings may be protected by cheese-cloth stretched on a frame. Apply to the roots, before the larvae have bored into them, two oz. of fresh white hellebore, steeped for half-an-hour in a gallon of hot water, at the rate of 1 pint to every 3 plants; or 40 parts water to one of the following: 1 lb. hard soap dissolved in 1 gall. boiling water, and churned thoroughly with 1 pint crude carbolic oil. In gardens, sand mixed with a little paraffin may be sprinkled round the stems, or a teaspoonful of carbon bisulphide may be poured into a hole near them, care being taken not to touch the plants with the liquid.

Lochmaea (Adimonia) saturalis. This insect typically spends the winter as an adult, but during the summer and autumn all stages are found, and, as in Ayrshire and Argyllshire last year, it is specially destructive of the heather shoots and leaves in July, August and September. Pheasants and black game eat the beetle readily, but the only practicable remedy would be burning the heather, if a permit were obtained to do this after May, when the insect is especially harmful.

Helephorus rugosus (turnip sand-beetle) is seldom troublesome, but a stimulating dressing should be applied if it attacks the plants, which should be ploughed in deeply if they have suffered much. The tuft of young leaves is eaten away at the edges, irregular patches are bitten out of the bases of the leaf-stalks and the swollen roots are gnawed. In November larvae were found feeding in the heart of the youngest central leaves, and pupated in the soil.

A description is given of *Tribolium confusum*, *T. castaneum (ferrugineum)*, *Tenebrioides (Trogosita) mauritanicus*, *Ephestia kühniella*, *Calandra granaria* and *C. oryzae*.

The *Chermes* of the Silver Fir uses a *Picea* as its primary and a *Larix*, *Pinus* or *Abies* as its secondary host, and its normal life-cycle may take two years. It deforms and curls up needles, and infests shoots, the attack upon which and upon the older barked parts may kill the plant. The tufts of woolly-looking material on the bark should be thoroughly brushed with a bristly

broom, before infestation spreads, or sprayed with paraffin emulsion, made by dissolving 1 lb. soft soap in 2 qts. boiling water, adding, at the same temperature, 1 pt. paraffin, and churning into a buttery mass. This, diluted in 5 gals. soft water, is useful against related forms on spruce, as is also a spray of 1 lb. soft soap to 1 gal. soft water. Badly infested Silver Fir nursery plants should be burned at once.

Otiorrhynchus picipes (the raspberry or clay-coloured weevil) and *Phyllobius maculicornis* (a leaf weevil) were very destructive, in Perthshire and elsewhere, last winter. *Otiorrhynchus* bites out the buds and gnaws the bark of shoots of raspberry, apple, plum, strawberry, damson and a number of broad-leaved trees. *O. sulcatus* hollows out underground begonia shoots, and the larvae of both species attack pot-plants in greenhouses. They hibernate sometimes as adults, but generally as larvae, pupation following in spring. Adults of *O. picipes* were found damaging oak and hazel in April, and rose-stocks, in Dumfriesshire, in May. The adults of *Phyllobius maculicornis* play havoc with the buds and leafage of young broad-leaved trees like birch, of rosaceous fruit-trees and of grafted plants, as do also those of *P. oblongus*. In 1912, *P. maculicornis* appeared in great masses on the raspberries. In summer the insects pair and pass to the soil to lay; the larvae feed at the roots. Vaporite incorporated in the soil is useful against them. Tanglefoot bands round the stems trap *Phyllobius*, or the adults can be easily shaken on to tarred boards or cloths in the early morning or on dull days. For *Otiorrhynchus*, this should be done while it is feeding at night; and as it hides in the daytime, sacking or bands of hay at the foot of the plants should be used as traps. Well painted walls, with a band of tar at the base, will keep it from wall-fruit trees, as it cannot fly.

Hylurgus piniperda (the pine beetle) breeds in felled or blown timber, which should be removed, or at least barked, by the beginning of May at latest; or, when blown down in summer, before two months have passed. Sickly trees should be felled here and there and left unbarked. The maturing broods can be destroyed before two months have expired by barking these trap-trees (of which relays should be arranged from April through the season) and burning the bark.

Silvestri (F.). **Notizia preliminare di un *Tetrastichus* (Imenottero Calcidide) parassita di *Ceratitis* e *Dacus* nell'Africa occidentale.** [Preliminary notes on a *Tetrastichus* (Chalcididae) parasitising *Ceratitis* and *Dacus* in West Africa.]—*Reale Accad. Lincei, Rome*, xxii, ser. 5, part 5, Sept. 1913, pp. 205-206.

The author describes *Tetrastichus giffardi*, sp. n., found by him parasitising *Ceratitis stictica*, Bezzi, and *C. giffardi*, Bezzi, in Nigeria in November last, and in pupae of *Dacus cucumarius*, Sack, in Kamerun, of *Ceratitis* on the Gold Coast and of *C. giffardi* in Dahomey, in January. Each parasitised pupa of

Ceratitis or *Dacus* was observed to yield from 15 to 34 parasites. The eggs are laid in those of the host or in the newly hatched larvae, not in those which have already worked their way into the fruit, nor in the pupae. It has not yet been ascertained whether a separate egg is laid for each individual, or whether one polyembryonic egg produces all those in the same host.

Hooker (C. W.). **Report of the Entomologist.**—*Ann. Report of Porto Rico Agr. Experiment Station for* 1912, *Washington*, 1913, pp. 34-38.

The insects enumerated by the author as being troublesome during the past year comprise sugar-cane borers, *Pieris monuste* (cabbage worm), *Eudamus proteus* (bean-leaf roller), *Cerotoma trifurcata* (bean-leaf beetle), *Laphygma frugiperda* (corn-ear worm), *Diabrotica vittata* (cucumber beetle), *D. graminea*, very abundant in the south and confining itself chiefly to weeds, and a beetle which is probably *Bostrychus monachus*. The adult of the last has been boring in grape fruit trees, pigeon pea, *Agati grandiflora* (gallito), flamboyant (*Poinciana regia*) coffee and citron, but only burrows, without eggs, larvae or pupae, were found, and the principal host plant is thus unknown.

The most troublesome coffee pest is *Myrmelachista ambigua ramulorum*, an ant from Culebra, Arecibo and Utuado, where populous colonies nested in hollow twigs, especially of *Coccoloba uvifera* (sea grape) and *Bicuda buceros* ("torchuelo"). In coffee it lives on dead wood and twigs, or under loose pieces of bark on the Guamá, a common coffee shade tree. It feeds largely on honeydew from *Pseudococcus citri* and a large, fleshy, pink scale of the subfamily Coccinae, carrying the Coccids into canals eaten out along the pith of the smaller new fruit-bearing growth, which becomes so weak as to break easily at harvest time. A native ant called "albayalde," which ousts *Myrmelachista*, is an effective remedy, while tanglefoot, repellants and poisons have been tried in vain, but the pickers fear its sting much more than that of its victims. *Leucoptera coffeella* (the coffee leaf-miner) is only kept down in certain parts of the island by two Chalcid parasites, and no better remedy is known. *Psychonotua* sp., known to bore orange, citron, rose apple and sweet almond in 1908, has now riddled coffee trunks and larger branches in some districts. If the burrows are short, a wire will kill the larvae; if not, the trees must be burned. In certain hilly parts coffee weevils feed on the leaves of coffee when the tree is fruiting, the larvae living on the roots.

"Caculos" (May beetle) in the hills also eat coffee leaves when adult, and the larvae the roots of sugar cane, coffee, citrus trees, pineapple and aguacate. In the west it is parasitised by a Tachinid (*Cryptomeigenia* sp.), and the extension of the parasite to other parts is being considered. *Metarrhizium anisopliae* is being distributed, with instructions for growing on yams and sweet potatoes. When the fungus turns

dark green a few squares should be mixed with several inches of earth in a box tightly covered with wire or cloth, some pieces of cane with tender leaves should be planted in the earth, kept moist, but not muddy, and a number of beetles should be rubbed over with fungus and kept in the cage. In a few days many will be dead and covered with fungus, and they and squares of fungus, mixed with earth, should be distributed at the base of the cane or trees, while the live beetles should be set free in the fields. A cage will serve for months, being filled with fresh beetles, and the cane being renewed so as always to have fresh leaves.

Anastrepha sp. breeds freely in "mangó de puerco," some Indian mangos, such as the Cambodiana, guava, jobo amarillo and jobo de la India. In jobo the larvae are commonly attacked by *Opius* (*Utetes*) *anastrephae*, Viereck, and *Ganaspis* sp. n., but in other hosts, many of which grow wild, it has unmolested access to the fruit, and in some cases all the year round. *Toxotrypana curvicauda* (the lechosa fruit fly) abounds at Mayaguez and is also found in Antigua, Brazil, Peru and Yucatan, the eggs are laid well below the surface of the green fruit, within which 2 to 15 larvae mature; and when it drops they pupate in the soil at a depth of 1 or 2 inches. The adults emerge in 17 to 21 days and lay soon after. Sweetened lead arsenate spray and daily destruction of the fallen fruit are fairly effective in controlling the pest. In May, *Tryptolaemus montrouzieri* has been distributed among sugar and pineapple growers, against *Pseudococcus citri*. *Hippodamia convergens* has been introduced into Mayaguez from California, to supplement the three native aphis-feeding ladybirds, Syrphid flies and hymenopterous parasites.

Guercio (Giacomo del). **Nuova contribuzione alla conoscenza dei nemici dell'Olivo.** [A further contribution to the knowledge of the enemies of the olive.]—*Redia, Florence*, ix, no. 1, 28th August 1913, pp. 59-75.

The author records that during this year the laying and hatching of the eggs of the *Lecanium* of the olive took place later than in 1912, the hatching lasting from the first half of June to the middle of August. The honey-dew secreted by the adult females is not only the primary cause of the appearance of the *fumaggine* fungus, but also serves as a food for the olive fly, *Oecophyllembius neglectus*, Silv.

A species of *Zeuzera* (locally called Rodilegno, Tarlo bianco or Tarlo giallo) abounds in Apulia on the olive, but only attacks the more delicate varieties, such as the so-called *ogliarole*. The *olivastro* is almost wholly free from it, as is also the wild olive—a splendid variety, not properly appreciated, bearing large and oily olives—and the Nardò olive. This last is to be recommended for the further reason that it is relatively immune from the olive fly, which, with few exceptions, only begins to perforate its olives in October, whereas from 50 per cent. to 100 per cent. of

the *ogliarole* are either spoilt or punctured. The first of the so-called wild olives is only second in importance to those of the Nardò. The *Zeuzera* not only attacks the olives of Apulia and a few plants in Calabria, but is also found in considerable numbers in Sicily and elsewhere. It is more common in the province of Lucca, and in certain parts of Massa Carrara, than in that of Leghorn. Apulia is, however, the region most affected, and not only branches a few years old, but also the larger ones and the trunk itself are injured, provided the bark is smooth. The affected branches dry up in the hottest season, and large numbers of flowers and fruit are lost in consequence.

In this region the labourers climb the trees and strip the galleries of the larvae in the infected branches, which they can recognise from the ground. Eight persons can thus examine from 12,000 to 14,000 large trees in about 20 days, ridding them of from 50,000 to 60,000 larvae. At Serranova, for instance, 45,145 were collected from the 1st to the 18th August 1911, and 46,768 by eight workpeople, from the 24th to the 7th of August 1912. The cost of collection, at 10 francs per 1,000, was 919.34 francs (about £37), an expenditure which saved from 100 to 200 tons of olives. This remedy should not be resorted to until the month of August, and should be continued until the last pupa has been removed. The branches attacked by *Zeuzera* are more subject than others to damage by *Hylesinus*, *Phloeotribus* and other Scolytidae.

In the spring of this year a very promising olive bloom in Serranova and its neighbourhood was blighted by the *nebbia*, the vulgar name for a legion of insects, the most common among which are the Tignola (*Prays oleaellus*, F.) and the Psylla (*Euphyllura olivina*, Costa), also called Cotonello or Bombacello. The former may be recognised by the perforated buds and by its silky slime and cocoons: the latter by a powdery, wax-like stratum on the dried and ruined clusters.

Experiments showed that the damage done by these two insects was about equal on the whole, though the one or the other sometimes predominated. That due to the Tignola would have been far greater but for the fact that the great majority of the larvae were parasitised by a species of *Ageniaspis*. Unfortunately in many cases this parasite had been killed by a microbe, and therefore did not, as it otherwise would have done, practically free the olives from the Tignola.

The author states that on the first of June he isolated several pairs of *Hylesinus oleiperda*, F., by means of wide glass tubes, upon living olive branches. The insects gnawed out long channels in various parts of the bark, and when the sap flowing into them had dried up, the females placed their eggs in burrows radiating from them. The larvae developed normally and fruit failed to appear on the affected branches. On the other hand, when the beetles were placed on dried wood or on cut branches kept in water, they not only failed to oviposit, but died without even attacking the bark. This proves, contrary to general belief, that *Hylesinus oleiperda* normally attacks living olives.

Malenotti (Ettore). **Sopra un nemico naturale della** *Pulvinaria camelicola*, **Sign.** [On a natural enemy of *P. camelicola*, Sign.].—*Redia, Florence*, ix, pt. 1, 28th Aug. 1913, pp. 113-115.

The author records the breeding of *Leucopis nigricornis*, Egg., from a scale-insect, *Pulvinaria camelicola*, sent to him from Ascoli Piceno on leaves and branches of orange, and says that in Europe the fly appears to have been previously recorded only from Austria. It is mentioned by Marsh as the natural enemy of *Macrosyphum sanborni* in the Hawaiian Islands; by Smith as the most common parasite in Nebraska of *Lepidosaphes ulmi*, *Eriopeltis coloradensis*, *Chionaspis americana*, *Ch. pinifoliae*, and *Ch. ortholobis;* and by Howard as the natural enemy of *Pulvinaria acericola* and other United States pests. Many species of *Leucopis* have been noted as parasites of Aphids and Coccids.

Die Reblaus in Baden. [Phylloxera in Baden.]—*Luxemburger Weinzeitung*, i, no. 25, 1st Sept. 1913, p. 431.

Baden, so far, has been the only German Federal State with large viticultural interests that was free from Phylloxera. However at the end of August a large 'focus' of this pest was discovered in the Lörrach district; it has probably been introduced from Alsace.

Marchal (Paul). **L'Acclimatation du** *Novius Cardinalis*. [The acclimatisation of *Novius cardinalis*.] — *Bull. Soc. Nat. d'Acclimatation, Paris*, no. 17, 1st Sept. 1913, pp. 558-562, 3 figs.

The author sketches the migrations of *Icerya purchasi*, accidentally introduced into California from Australia in 1868; recognised in Portugal, along the banks of the Tagus, about 1873; found at Portici, near Naples, in 1900; met with subsequently in Egypt, Syria, the Greek Archipelago, Dalmatia, and Sicily, and appearing at length at Saint-Jean-sur-Mer, in the French Department of the Maritime Alps, where it was found to have been brought over on plants purchased in Naples in 1910. Local attempts at extirpation were supplemented by the introduction, in July 1912, of *Novius cardinalis*, the natural enemy which, in its native Australia and elsewhere, has reduced this *Icerya* to harmlessness. This experiment has proved entirely successful, for the Coccinellid, having thoroughly established itself, is keeping the scale-insect satisfactorily in check.

Stein (F.). **Bekämpfung des nashornkäfers.** [Control of the rhinoceros beetle.]—*Tropenpflanzer*, xvii, no. 9, Sept. 1913, pp. 481-488.

On a large coconut plantation in German East Africa, stocked with 300,000 palms, of which 5,000 were bearing, hundreds of palms succumbed daily to the attacks of the rhinoceros beetle.

The author therefore devoted himself exclusively for one year to the study of this pest, and arrived at four main conclusions regarding its control.

In the first place, young palms ought only to be planted on previously cultivated soil, as they are apt to be weakly on recently cleared ground. Where land is being cleared for coconut plantations, all stumps, grass, etc., should be burnt and the ashes uniformly distributed and then deeply ploughed in. Two men should follow the plough and collect all the larvae and beetles. The palms should be planted only one or two years after the ground has been utilised by planting maize, manioc, peanuts, etc.

A second essential method of control is avoiding the proximity of dense forests, which afford the pest an unlimited amount of shelter. It is a safe rule to plant coconut palms at least 300 yards away from the forest, and the latter should be cleared of decaying timber for about 100 yards. The author observed that the flying powers of the rhinoceros beetle are limited to a very short distance.

A mistake is frequently made in planting the palms too close, as the pest thrives in shady spots. For the same reason only crops affording little shade should be planted between the rows. The most suitable of these crops is the sisal agave, which the author observed to have the effect of driving the larvae away. The ground should be kept well hoed.

Clean cultivation is the fourth important point. Special attention should be paid to rotting trunks, as many as one hundred beetles and their larvae being found in a single one. They also prefer soft, porous wood, like that of the "doum" palm.

The author is confident that all these measures, if legally enforced among the natives, will make the pest comparatively harmless in German East Africa, as well as in Samoa. He also mentions the possibility that a fungus disease of the coconut palm, which causes the innermost leaf to rot, is spread by insects.

Bekämpfung der Rebschädlinge. [Control of vine pests.]—*Weinbau der Rheinpfalz, Neustadt a. Hdt.*, i, no. 18, 15th Sept. 1913, p. 236.

The first result of an international 'entente' regarding the control of vine pests is the collaboration of M. Paillot and Prof. Schwangart in studying the vine moth. Prof. Schwangart will also get into touch with vine-growers in Tyrol in order to discuss spraying and other control methods. The protection of birds is being fostered by the planting of special shrubberies and woods in France and Germany, and a vine-pest committee has been appointed in the German Viticultural Association.

The Protection of Grapes against *Clysia* by means of paper bags.—*Schweiz. Zeits. für Obst- und Weinbau, Frauenfeld*, xxii, no. 17, 12th Sept. 1913, p. 270.

In Rüdesheim on Rhine grapes were enclosed in paper bags against the second generation of *Clysia ambiguella*. Several owners of vineyards state that this method has been most successful, and the grapes protected in this manner were even better developed than the unprotected ones.

Bohutinsky (—). **Verheerendes Auftreten der Kieferneule in Böhmen.** [Devastating appearance of *Panolis piniperda*, Pnz., in Bohemia.]—*Vereins schrift für Forst-, Jagd- und Naturkunde, Prag*, no. 4, 1913-1914, pp. 259-260.

In several forest ranges in northern Bohemia *Panolis piniperda* has appeared in such enormous numbers as completely to defoliate the pine-trees in certain localities. In one forest about 15,000 acres of pines were defoliated. The cold and damp weather in June 1913 had no influence on the spread of the pest, but in July tachinosis and the polyhedral disease appeared to check it considerably, and no further spread is anticipated, at least for some districts.

Kurdjumov (N. V.). МАССОВОЕ ПОЯВЛЕНИЕ ЛУГОВОГО МОТЫЛЬКА [Serious outbreak of *Phlyctaenodes sticticalis*, L., near Poltava.]—ЛЮТОРЯНИНЪ [Jl. of the Agric. Soc. of Poltava], no. 26, 10th July 1913, pp. 697–698.

The author draws attention to the appearance of this insect during recent years and especially to the damage done by it in 1901. In 1909 the moth appeared in great numbers, but owing to the small quantity of caterpillars produced it proved practically harmless. In the summer of last year the insect again appeared in fairly large numbers, and it was observed on the experimental field at Poltava throughout the second half of July and the first half of August, but especially in July. The insects appeared quite suddenly, and as there were no caterpillars the author suggests that it invaded these fields from some other places in the neighbourhood. This year (1913) the insect appeared again, quite unexpectedly, but considerably earlier. It was noticed in the experimental field on the 19th May and on the 21st it reached its maximum. At the end of May oviposition took place and soon afterwards the caterpillars emerged and complaints reached the Station of damage done by the latter. In the middle of June the caterpillars passed into the earth and pupated, and at the time of writing the article (beginning of July) the flight of the second brood had started, which is likely to be as numerous, if not more so, than the first. The author recommends the following remedies:—(1) to spray the plants with a 2-5 per cent. solution of barium chloride or of Paris green; (2) to dig trenches round the fields, when the migration of the larvae begins; (3) to fumigate the plantations of beet during the time of flight; (4) to mow and remove the fodder-grasses before the end of July; and (5), as suggested by some owners, to collect and kill the insects by hand, when they sit on the leaves of the beets. [For a fuller account of this pest by Mokrzecki, see this *Review*, Ser. A, 1, pp. 359-361.]

Recipe of barium chloride suggested:—3 lb. in about 14 gallons of water, or even 15 lbs. in 27 gallons; about 1 lb. or more of molasses may be added to secure adhesion. If Paris green be used:—3-4 lb. of green; 6-8 lb. of caustic lime; about 110 gallons of water.

NIKOLAEV (P.). СОСНОВЫЙ ПИЛИЛЬЩИКЪ [A pine pest. *Lophyrus pini*].—ХУТОРЯНИНЪ [Jl. of Agric. Soc. of Poltava], no. 25, 3 July 1913, pp. 676–677.

Some years ago the larvae of a sawfly, *Lophyrus pini*, appeared in S.W. Russia, and having crossed the river Dnieper, invaded the Government of Poltava. The insect has done great damage to pine forests, especially to young trees, by eating away the needles: the growing summits are not touched, as their needles have a bitter taste. The insect has two broods. The first brood flies and oviposits in May, and the larvae soon begin to strip the pine needles, so that the trees turn yellow and cease growing. The second generation appears early in August and the larvae continue their destructive work until the late autumn, pupating underground when the early morning frosts become more intense. Sometimes, however, there is only one generation, when the weather conditions do not favour the development of a second.

The author suggests the following remedies:—(1) shaking the larvae from the trees on to cloths by striking the tree-trunks with a wooden mallet—a method which is not very effective; (2) spraying with Paris green, the following recipe being recommended: 1 lb. of green, 2 lb. of copperas and about 3 lb. of slacked lime in 55 gallons of water. Spraying with this solution has given very favourable results in the district of Migorod, in the Government of Poltava.

ОПЫТЫ БОРЬБЫ СЪ ВРЕДИТЕЛЯМИ ОЗИМАГО ИЛИ РЪПАКА [Experiments on fighting the pests of winter rape]. Preliminary Report issued by the Bio-Entomological Station of the Zemstvo of the Government of Bessarabia at Kischinev, 1913, pp. 5.

Winter rape is a very useful plant, but its cultivation has greatly decreased in Bessarabia, owing partly to unfavourable weather conditions, but chiefly to the damage done to it by insect pests. The most serious pests are the larvae of the sawfly, *Athalia spinarum*, which feeds usually on grasses, and *Entomoscelis adonidis*, of which the larva eats the plant in the autumn and spring, and the imago in the summer. Amongst other pests are mentioned:—*Epicometris hirta*, which eats the flowers of rape in the spring; *Strachia oleracea* and *S. ornata* injure the stalks, leaves and pericarps: *Ceuthorrhynchus sulcicollis* oviposits on the stalks near the root-neck and the larvae eat the tissues, causing the formation of abnormal knobs and the withering of the plants: and *C. assimilis* injures exclusively the pericarps. Besides these pests there are also many others which usually do not cause serious damage, except in the years when they appear in great quantity, such as the larvae of *Agrotis segetum* and of *Melolontha vulgaris*—which injure the roots of the plants. The larvae of *Baris picina*, *Baris chloris* and *Anthomyia brassicae* live inside the stalks. The leaves are eaten by the caterpillars of *Pieris brassicae*, *P. napi*, *Feltia* (*Agrotis*) *exclamationis*, *Barathra* (*Mamestra*) *brassicae*, *Plusia gamma*, and *Plutella maculipennis*; and by the beetles *Haltica oleracea*, *H.*

nemorum and *Psylliodes chrysocephala*. The flowers of rape are attacked also by *Meligethes aeneus*; the ripening pericarps, by the caterpillars of *Orobena margaritalis* and by the larvae of *Cecidomyia brassicae*.

The report further describes experiments conducted by the Station on a large plot of 57 acres on an estate on the river Dniester in the district of Orgeev. The sowing of the rape began on the 31st July 1911 and proceeded up till the 6th August. Nothing was noticed till the 21st August, but on the 25th, half of the seedlings were destroyed by *Athalia spinarum*, the enormous numbers of which threatened to destroy the plants on the whole field. Investigation proved that the insects came from some neighbouring plots, on which maize had been sown and in the midst of which *Brassica campestris* grew freely as a weed, and on this plant the larvae had developed.

To fight the insects, spraying with Schweinfurt green and "Krasson" was started on the 29th. The first insecticide was used in a proportion of 1½ lb. of green and 7½ lb. of freshly slacked lime in about 55 gallons of water. The second insecticide was used in the proportion of 15 lb. in 58 gals. of water.

Schweinfurt green gave no favourable results, owing to the peculiar qualities of the leaves of rape, which are covered, as are those of many other cruciferous plants with a greasy substance which repels the insecticide. The second mixture has many advantages over the first; chiefly owing to its ability to absorb kerosene, turpentine and other hydrocarbons and dissolve afterwards in water, the muddy mixture having nearly the same gravity as water. The presence of kerosene lightens the gravity of the insecticide and causes it to adhere to the leaves. The spraying was continued from the 29th August to the 1st September, during which time about 19½ acres were treated by means of the Vermorel knapsack sprayer. The results of the spraying were noticed the day after the spraying was begun. On 1st September the insects were found to be dying in great masses, and when the fields were re-examined on the 16th September it was discovered that the spraying had produced excellent results. The sprayed plants recovered and grew very quickly. No larvae were found on digging in the earth, so they were evidently all destroyed.

On the 26th September the plants were in good condition and some few beetles of *Entomoscelis adonidis* were found. The report points out that whereas the last-named insect usually oviposits in the first half of October and hibernates in the larval stage, that was not the case in 1911. The insects began to oviposit only at the end of October and wintered in the egg stage. This was noticed in 1911 everywhere in Bessarabia.

Noel (Paul). **Destruction de la** *Zeuzera aesculi*. [The destruction of the Leopard Moth.]—*Bulletin du Laboratoire Régional d'Entomologie Agricole, Rouen*, pt. 4, 1913, p. 14.

The withering of the cork-oaks of the Massif de l'Edough, in the Algerian Department of Constantine, is chiefly due to the caterpillar of *Zeuzera pyrina*, L., which burrows in the trunk and

branches of the trees. It is probably the same as *Zeuzera aesculi*, the habits of the two insects being identical. Bisulphide of carbon has been used successfully in Algeria against the caterpillar of *Z. pyrina*, the liquid being injected into the gallery and the opening being stopped up with plaster or clay. Where the galleries are vertical, part of the liquid is lost before the aperture can be closed, and to remedy this the sulphide is put into gelatine capsules, the covering of which dissolves in about 24 hours. It has been conclusively proved that the sulphide has no deleterious action on the trees, and in the Massif de l'Edough it has almost entirely freed them, in three years' time, from the *Zeuzera*.

La Cochylis, l'Eudemis e l'estratto di tabacco. [Cochylis, Eudemis and tobacco extract.]—*Rivista di Agricoltura, Parma,* xix, no. 34, 22nd Aug. 1913, pp. 535.

Certain figures are quoted from the journal "Economia Rurale" as the results obtained at Lasparre, in the Gironde, in three vineyards two of which were each twice sprayed with extract of nicotin (1½ to 2 per cent.), both vineyards having been attacked by *Clysia* and *Polychrosis* in the same manner and to the same extent. The results show that on 12,276 vines which were not treated there was a diminution of 6,566 litres of wine.

Krassiltchik (I. M.) and Vitkovsky (N. N.). **ОТЧЕТЪ О ДѢЯТЕЛЬНОСТИ БІО-ЭНТОМОЛОГИЧЕСКОЙ СТАНЦІИ ВЪ 1912 ГОДУ** [Report of the Bio-Entomological Station of the Zemstvo of the Government of Bessarabia for the year 1912]. Kischinev, 1913, 26 pp.

The report gives an account of work done at the Government Station and the experiments conducted in the experimental garden near Kischinev on different garden pests. Against *Sciaphilus squalidus*, *Rhynchites bacchus*, *R. aequatus*, *R. pauxillus* and *Anthonomus pomorum*, the following remedies were tried:—

(*a*) Bait-belts with tanglefoot proved of little use against *Sciaphilus squalidus* and *Rhynchites*. The belts served rather to frighten away the insects than to catch them and besides the dry winds prevailing in Bessarabia caused the belts to be covered with dust, which formed a dry coating over which the insects passed freely on to the trees; the belts are also useless as soon as the *Rhynchites* begin flying.

(*b*) Linen skirts, a modification of the German Insekten-Fanggurtel "Einfach." The skirts were put on the trees in such a way that a great number of pleats were formed at the place where they were tied, and in order that the lower part of the skirts should stand away from the trees a thin wire was put through the edge. These skirts proved very useful and a great number of *Sciaphilus squalidus* and *Rhynchites pauxillus*, as well as other insects, were found underneath them and could be easily destroyed by rubbing the outside of the linen with the hand. Sometimes

as many as 150 specimens of the two insects named were found in the morning on one tree, especially in cold weather. The only disadvantage of this remedy is that sometimes useful insects, ladybirds amongst them, get into the skirts and are destroyed.

(*c*) Zinc bait-rings, being modified bait-rings invented by Kirjachenko, and consisting of two semi-circular gutters connected together by loops and pins each half forming a separate receiver for liquid. The rings were filled with water, a thin stratum of kerosene being poured over it. In order to prevent the insects getting on the tree by way of the thin bridge formed by the adjoining ends of the two halves, this bridge had to be smeared with tanglefoot. These rings proved very effective and up to 225 insects were secured daily in this way.

(*d*) Good results were also obtained by shaking the insects from the trees, which were previously sprayed with water.

Spraying the trees with milk of lime was not experimented upon for various reasons. The Station has also studied the biology of the insects, and the connection between the injurious activity of *R. bacchus* and *R. aequatus* and the infection of apples by certain fungi, which are to be proceeded with this year.

Tropinota hirta.—Good results were obtained by shaking the insects from the trees which had been sprayed previously with water.

Laspeyresia (*Carpocapsa*) *pomonella.*—This pest has two broods in Bessarabia. It winters in the larval stage and the first moths appear at the end of May. The first injury to apples was noticed in the first half of July; the pupation of the caterpillars of the first generation began at the end of July, the flight of the moths of the second generation at the beginning of August and throughout the month. During the second half of September the caterpillars of the second generation got into the bait-belts to pass the winter there. Bait-belts were used from the time when the caterpillars of the first generation started pupating till the beginning of frosts, and this remedy is specially recommended against the caterpillars of the second generation which winter in the belts. In the autumn many useful insects were also found in the belts, so that it is suggested that their contents should be examined before being destroyed.

With regard to insects injurious to field crops, the most serious pests of the latter during last year appears to have been *Oscinis frit.* This fly oviposits on the stalks of cereals, near to the earth. The larvae gnaw a passage through the stalk to the central shoot. The observations of last year have proved that *O. frit* oviposits also on the central leaves of the stalks, in which case the larvae get inside the parenchyma of the leaves, mining them through till they reach the petiole.

The insect winters in Bessarabia as a larva. In the year under report the flies of the first brood appeared at the end of April and were on the wing for about a month. At the end of June those of the second brood began flying, the larvae of this generation appearing throughout July. Observations have shown that the flies of the second generation attack chiefly oats and oviposit mostly on the leaves and on the panicles, which are also attacked

by *O. pusilla*, it being assumed that it is only the latter insect which attacks the grain of oats. In the middle of August the third brood of flies appears, the larvae feeding on fallen corn and on early winter sowings. On the 3rd October the flight of the fourth brood took place and the larvae of this generation damaged the sowings of winter cereals. Thus the insects have four generations and the late appearance of the last one does not allow the owners to protect their fields by late sowings. Even the fields sown from 23rd-28th September were in a great degree damaged by *O. frit*. The injury done by the insect yearly is enormous.

The Station experimented on fighting the insect by means of trap crops, which gave good results; but in order to obtain the same results in practice it is necessary that the method should be applied systematically over the whole area attacked. There is a widespread opinion that in order to fight *O. frit* it is sufficient to plough in the damaged seedlings, as the flies cannot get out from a stratum of earth 7-9 inches thick. An experiment at the Station proved that this opinion is wrong. At the bottom of a glass a number of pupae of *O. frit* were placed, and these were covered with 7-9 inches of earth rammed down and kept wet. The flies got out freely from underneath the earth and the authors presume that they would also be able to get out again from a stratum of earth after ploughing which would contain many cavities and exit holes.

The report deals also with *Spermatophilus guttatus*.

The station has also experimented on the insecticides "Korsunsky" and "Arsenit." The first one proved to be very effective in destroying insects, whilst the second one is weaker and merely delays their development.

Legislation to prevent the introduction of Insect Pests into Mauritius. —*Proclamation* no. 81, *St. Louis, Mauritius*, 6th Aug. 1913.

The importation of the following articles into Mauritius from any country or place whatever is absolutely prohibited:—grape-vine cuttings and plants, except when covered by a certificate from the Board of Agriculture, or other competent authority, of the country of origin that the vines have not been exposed to the infection of *Phylloxera* for the six weeks prior to the date of shipment; earth, and leaf and garden mould; sugar-canes or cuttings thereof, and live plants of all sorts; dung (except guano); forage; and timber with the bark on.

The following articles may not be introduced unless written permission has previously been obtained from the Director of the Department of Agriculture:—sugar-canes or cuttings thereof; living plants or bulbils of *Agave* or *Fourcroya;* and tea plants.

The following articles will be inspected at the port of entry:—sugar-canes or cuttings; live plants of all sorts; and fresh citrus fruits from all countries except the Dependencies of Mauritius. If pests or diseases are found amongst them the plants may be either disinfected or destroyed.

If removal is authorised, the plants have to be planted in a separate nursery and are to be subject to inspection by the Department of Agriculture during twelve months from the date of importation.

Cosens (A.). **Reports on Insects for the Year 1912; Toronto District.**—*Ann. Report Entom. Soc. of Ontario, Toronto,* 1913, pp. 17-20, 3 figs.

Typhlocyba comes (Grape Vine Leaf-hopper) was very plentiful on *Ampelopsis veitchii*, making the leaves on which it fed pale and blotchy. *Gossyparia spuria*, Mord. (Elm Bark Louse), has not materially injured the larger introduced elms, and *Ulmus americana* is seldom attacked by it. *Euclemensia bassettella*, Clemens, has checked the scale, *Kermes galliformis*, Riley, almost to the point of extinction. *Lepidosaphes ulmi*, L. (Oyster-shell Scale), appears to become more destructive each year in the apple orchards, probably because diseased and useless trees are left as centres of infection for the young stocks, and as there are few of these the bulk of the plants are growing too old to resist effectively.

Gibson (A.). **Reports on Insects for the Year 1912; Ottawa District.**—*Ann. Report Entom. Soc. of Ontario, Toronto,* 1913, pp. 11-17, 10 figs.

In the earlier part of the season *Euxoa messoria* (Dark-sided Cutworm) and *E. ochrogaster* (Red-backed Cutworm) did considerable damage among young turnips, beets, radishes and newly set-out cabbages and cauliflowers. Root maggots, though not so numerous as in the previous year, destroyed many radishes, cabbages, cauliflowers and onions, the Radish Maggot attacking turnips and the Corn-seed Maggot doing conspicuous injury to seed in eastern Ontario, as well as in the Ottawa district. *Lachnosterna* (White Grubs) were very abundant, chiefly damaging strawberries, potatoes and corn. *Mamestra picta* (Zebra Caterpillar) hibernates in the ground in the pupal state and the moths, emerging in May, lay clusters of eggs on the leaves of low-growing weeds and other plants, such as lamb's quarters. The larvae appear about a week later and are full-grown at midsummer, and sometimes they do serious damage to turnips, cabbages, peas and clover. A second brood appears in the latter part of August. At Ottawa, on the 18th September, swarms of the larvae were quickly devouring the cabbage leaves, and in the late autumn they are common on asparagus plants. *Phyllotreta vittata* (Turnip Flea-beetle) and *P. armoraciae* (Horseradish Flea-beetle) are announced in the district, the latter, first observed on radishes on the 31st May, apparently being a new arrival. On the 31st July two adults of *Hylastinus obscurus* (Clover-root Borer), which has caused noticeable loss in the alfalfa, were found in a root tunnelled by the larvae. *Malacosoma americana* (American Tent Caterpillar) caused widespread defoliation. The larvae were first observed hatching on 30th April; by the end

of the first week in May there were thousands of webs, especially on apple and wild cherry trees, and these were being burned in the latter half of the month. In unsprayed orchards *Laspeyresia* (*Carpocapsa*) *pomonella* (Codling Moth) was unusually abundant, as were also *Lepidosaphes ulmi* (Oyster-shell Scale), *Hyphantria textor* (Fall Web-worm) and *Eriocampa cerasi* (Pear Slug). *Malacosoma disstria* (Forest Tent Caterpillar) defoliated poplar, birch, maple, oak, ash, willow, apple, wild cherry and raspberry for miles in the Gatineau Valley and from Ironside to Chelsea and Kingsmere. The destruction was complete on 4th June, and in the last week of May and first week of June the larvae, of which such numbers had not been seen by residents of sixty years' standing, constantly stopped the Canadian Pacific trains. The first moths emerged early in July, and about the middle of the month they were ovipositing in myriads on fences, electric light poles and shade trees in the streets of Ottawa. An apparently fungous disease destroyed many larvae, just before maturity in the vicinity of Chelsea, Que. Reference is also made to several minor garden pests.

Hewitt (C. G.). **Review of Entomology relating to Canada in 1912.**—*Ann. Report Entom. Soc. of Ontario, Toronto,* 1913, pp. 34-37.

In the course of his address to the Entomological Society Dr. Hewitt recalls the establishment and objects of the Imperial Bureau of Entomology and the part taken by Canada in securing for it a broader basis. The value of inspection is emphasised by the discovery at Vancouver, in a shipment of trees from Japan, of a *Thuja* bearing eight egg-masses of the Gipsy Moth, from which hundreds of larvae had emerged by the time they were taken on to Ottawa. *Mesoleius tenthredinis*, a new species which had well parasitised the cocoons of the Larch Sawfly in the English Lake District in January, was taken to the Riding Mountain Forest Reserve in Manitoba, apparently the present extreme western limit of the Sawfly, in the hope that it would establish itself there.

Hudson (H. F.). **The Chinch Bug in Ontario.**—*Ann. Report Entom. Soc. of Ontario, Toronto,* 1913, pp. 46-50, 1 fig.

In Western Ontario *Blissus leucoptera*, which hibernates in the adult stage under leaves and rubbish, paired last year about the middle of May, and the first eggs were observed on the 28th. The first winged specimens appeared on 11th August, giving a life-cycle of 54 days, and the flights began on 5th September. The eggs are laid on the leaf-sheath, or underground on the finer roots. The larvae feed on the roots below the surface for a week at least, and sometimes for a month. Meadow grasses, especially "timothy," suffer most, and wheat, corn and oats have only been attacked when near a meadow. Damp is unfavourable to the insect. *Sporotrichum globuliferum* depends too much upon the weather to be reliable, and an experiment in the artificial

reproduction of the fungus was marred by the cold. Thorough burning of all rubbish as late as possible in the autumn, with regular rotation, is recommended, as also the ploughing in the early autumn, and sowing with wheat, of a strip of land next the wood lots in which the insects hibernate. On their reappearance they and their eggs could be destroyed by efficient ploughing and immediately rolling the ground. There is no remedy for a badly infested meadow except autumn ploughing, followed by a hoe, or a leguminous crop. Corn threatened from a neighbouring pasture may be protected by spraying with a 10 per cent. solution of kerosene, which, however, must not be poured into the heart of the plant and should be applied early in the morning or late in the afternoon. For less vigorous corn, thoroughly dissolve 2 oz. soft soap in 1 gall. of nearly boiling water, then add ½ oz. "Blackleaf 40." If the insects have already taken possession of the corn field, a space about 1 ft. wide, in which holes 12 in. to 16 in. deep are dug from 30 ft. to 35 ft. apart, should be cleared round it before harvesting, and on this clear surface a thin line of No. 7 asphalt road-oil should be poured, passages from the field to the holes being alone left free from it. As harvesting proceeds the insects escape to the holes, and when they have fallen in a little kerosene should be poured on to them.

Tothill (J. D.). **Introduction of the Insect Enemies of the Brown-tail Moth, *Euproctis chrysorrhoea*, Linn., into New Brunswick and some Biological Notes on the Host.**—*Ann. Report Entom. Soc. of Ontario, Toronto*, 1913, pp. 57-61.

The author describes the taking of puparia by *Campsilura concinnata*, Mg., about the middle of July, from Massachusetts to St. Stephen and Fredericton. Three miles from the latter colony, across a river almost three-quarters of a mile wide, one of the flies was found to have oviposited in larvae of *Hyphantria cunea*. From Massachusetts 85 adult *Calosoma sycophanta*, L., were also sent to New Brunswick, where, in spite of unusually cold and wet weather, sufficient larvae were reared to attempt their hibernation. One *Calosoma* beetle died, being parasitised by *Biomyia georgiae*, B. & B., also found on the American varieties *C. calidum*, F., and *C. peregrinator*, Guér. *Trichogramma* sp. and *Phorocera leucaniae*, Coq., are known to be natives of New Brunswick, and it is believed that two more enemies of *Hyphantria*, *Pteromalus egregius*, Först., and *Monodontomerus aereus*, Walk., also live in the country. It is hoped that these will all attack *Euproctis chrysorrhoea* as well as *Hyphantria* in New Brunswick, since they do so in Massachusetts. In the former place nearly 90 per cent. of *Euproctis* nests have been found on apple trees, 3·26 per cent. on bilberry, 2·9 per cent. on thorn, 1·83 per cent. on choke cherry and barley and on other plants. It is suggested that *Euproctis* was blown into New Brunswick from the high lands in Maine, and "breeds back" to its original hosts there; and that the average of 110 less eggs per female than in Massachusetts is due to the greater capacity for long migration of the less weighted individuals.

Sanders (G. E.). **San José Scale in Nova Scotia.**—*Ann. Report Entom. Soc. of Ontario, Toronto,* 1913, pp. 61-66, 3 figs.

A small quantity of dead San José Scale was found on 8th April 1912 on some "Stark" trees at Aylesford, and on 28th May living ones were discovered there. In consequence, all trees of 1910, 1911 and 1912 planting throughout western Nova Scotia were examined between 5th June and 1st Nov., and the infected trees, which were confined to Hants, King's, Annapolis, Digby and Yarmouth Counties, were destroyed. The first scales were found moving on the trees about 10th July; they were very abundant on them in the middle of the month and were moving as late as August. The average period for Ontario, on the other hand, is between 10th and 30th June.

Ross (W. A.). **Recent Work on the Apple Maggot in Ontario.**—*Ann. Report Entom. Soc. of Ontario, Toronto,* 1913, pp. 67-72.

During experiments carried on at Bowmanville, adults of *Rhagoletis pomonella* emerged from the first week of July to the middle of September, but no laying was observed till the third week in July. The minimum period of incubation was $4\frac{3}{4}$ days, the average 6, the maximum 9. The author gives elaborate details with regard to the baits, repellants, sprays, soil fumigants, burying of pupae and shallow cultivation, but the net result of data collected during two years is that nothing is really effective except the collection of fallen fruit, which will free an orchard if summer apples are picked up every other day, autumn and early winter varieties every second week, and winter varieties every third week. Poultry were found to free marked portions of ground from pupae placed in it. In a list of over thirty varieties of apples none was exempt, but the acid suffered much less than the sub-acid and sweet kinds. Seedling trees were much infested, even in the case of crab-apples, and in St. Anne's, Que., larvae and pupae were secured from haws. In Ontario the pest occurs in Prince Edward, Hastings, Frontenac, Northumberland, Durham, Ontario, Wentworth, Lincoln, Welland, Norfolk, and Carlton Counties.

Petch (C. E.). **Insects of Quebec for the Year 1912.**—*Ann. Report Entom. Soc. of Ontario, Toronto,* 1913, pp. 72-75, 3 figs.

Malacosoma americana (American Tent Caterpillar) and *M. disstria* (Forest Tent Caterpillar) entirely defoliated many unsprayed orchards. *Galleria mellonella* (Larger Wax-moth) and *Achroia grisella* (Lesser Wax-moth) entirely destroyed the combs in some twenty beehives. *Eulecanium nigrofasciatum* (Terrapin Scale) badly infested plum and birch. *Lepidosaphes ulmi* (Oystershell Scale) was very plentiful on apples and plums, and *Aphis pomi* (Green Aphis) on nursery stock and suckers. Buffalo

Tree Hoppers, Snowy Tree Crickets, Blister Beetles and Flea-beetles were fairly common, but Grasshoppers and Potato Beetles were not. *Saperda candida* and *Chrysobothris femorata* (Apple-tree Borers), like *Tischeria malifoliella*, were very prevalent in some orchards. *Typhlocyba comes* (Grapevine Leaf-hopper) very early stripped grape vines and Virginia creeper of the greater part of their foliage; PENTATOMIDAE (Stink Bugs) were common, as also *Lygus pratensis* (Tarnished Plant Bug), especially in the hoed crops, late in the season. *Conotrachelus nenuphar* (Plum Curculio) and *Anthonomus quadrigibbus* (Apple Curculio) were very injurious. The latter is worse near Covey Hill, and in Chateauguay Basin it was very injurious to early apples. Its egg-punctures produce hard green cores penetrating nearly to the centre, distorting the fruit and spoiling it both for eating and cooking. The adults feed first on the early varieties. This year they began with the first week in August, reached their maximum in the second and third, and continued until 3rd Sept. Lights, tanglefoot and poisoned baits were of no avail, but spraying with lime-sulphur or Bordeaux mixture greatly lessened the injury, and an orchard cultivated, pruned and properly sprayed, though previously much infested and though surrounded by others in which the pest abounded, was entirely freed from it.

CAESAR (L.). **Insects of the Season in Ontario.**—*Ann. Report Entom. Soc. of Ontario, Toronto*, 1913, pp. 75-84, 10 figs.

Codling Moth was less abundant, partly because the wet, cold season must have lessened the percentage of the second brood and also because thorough drenching of the bloom with spray has given very satisfactory results. *Enarmonia prunivora* (Lesser Apple Worm) abounds in haws, and this year attacked apples at Guelph and in the Niagara District, and some cherries at St. Catharine's. *Conotrachelus nenuphar* (Plum Curculio) did much damage to cherries, plums, peaches, pears and, especially in the Niagara District, to apricots. In the autumn there was less of it than usual on the apples. *Anthonomus quadrigibbus* (Apple Curculio) was not frequent on apples. *Eucosma* (*Tmetocera*) *ocellana* (Bud Moth) seldom troubled well sprayed orchards. A normal number is expected the following spring. *Coleophora fletcherella* and *C. malivorella* (case-bearers) and *Dichomeris ligulella* (*Ypsolophus pomotellus*) (Palmer Worm) were less numerous than usual. *Malocosoma americana* (American Tent Caterpillar) has increased abnormally in the eastern half of Ontario alone, especially east of Toronto and of Brighton. Orchards sprayed with lime-sulphur before the buds burst and with lime-sulphur and lead arsenate before the blossoms did so, were almost entirely free from nests and larvae. *Alsophila pomelaria* (Fall Canker-Worm) was much more destructive than usual at Dundas, Stoney Creek and some other districts. Spraying before the blossoms burst was found to clear a badly infested orchard. The adults emerged about 11th October. *Aphis sorbi* (the Rose Aphis) turned many leaves sickly and yellow on the lower apple branches in the Niagara District and

deformed much of the fruit. *Aphis avenae* was very destructive to nursery stock and young orchards in August and September. Ladybird beetles, their larvae, and other predaceous insects were very helpful against them, and Hymenoptera parasitised about 50 per cent. of *Myzus ribis* (Currant Aphis), which did much damage. *Myzus persicae* (Peach Aphis) appeared in small numbers early in June and *Schizoneura lanigera* (Woolly Aphis) was also not unusually abundant. Experiments showed "Black Leaf 40," with lime-sulphur, to be fatal to Aphids, but the remedy is unfortunately expensive. *Aspidiotus perniciosus* (San José Scale), which appeared near Woodstock, was combated by spraying with lime-sulphur. *Eriophyes pyri* (Blister Mite) was successfully treated by spraying before the buds burst, on 25th April, and the same result was obtained on 6th May, after they had done so. *Bryobia pratensis* (Brown Mite) had turned plum leaves in Niagara District a dull grey at the end of August, while *Tetranychus bimaculatus* (Red Spider) had done much injury to currant leaves. *Rhagoletis cingulata* and *R. fausta* (Cherry Fruit Flies) did much damage to Montmorency cherries, and in certain orchards between Lake Ontario and Beamsville. *Macrodactylus subspinosus* (Rose Chafer) was equally destructive on grapes, raspberries and young cherry trees. *Eriocampoides limacina* (Pear and Cherry Slug) was less common than usual; it chiefly attacked young cherry trees. *Typhlocyba comes* (Grapevine Leaf-hopper) was less destructive than last year; *Janus integer* (Currant Stem-girdler) appeared in small numbers at Fruitland, *Aegeria tipuliformis* (Imported Currant Borer) attacked a large number of canes, *Haltica chalybea* (Grapevine Flea-beetle), of which the larvae were found on wild grape leaves in June, badly infested several vineyards in the Niagara District, where *Bembecia marginata* (Raspberry Root-borer) has taken possession of old raspberry plantations. *Anthonomus signatus* (Strawberry Weevil) was doing injury in Brant County, and *Metallus rubi* (Blackberry Leaf-miner) was abundant in parts of the Niagara District. This does no damage till the middle of July, when the forming fruit is well advanced. The larva hibernates in a round earthen case about 5 mm. in diameter, difficult to break. Spraying with kerosene emulsion seems useless, and the author suggests removing the earth in spring from under the bushes, to the depth of about two inches, and following this by frequent cultivation. Cutworms, except the red-backed variety at Burlington, have been rare, as also *Pegomyia brassicae* and *P. cepetorum* (Cabbage and Onion Maggots), *Diabrotica vittata* (the Cucumber Beetle), *Crioceris asparagi* and *C. 12-punctata* (Asparagus Beetles) at Guelph. *Leptinotarsa decemlineata* (Colorado Beetle) has been kept within bounds by *Perillus bioculatus* var. *claudus*, but was quite common at Guelph and in other parts of Western Ontario, and as far east as eight miles from Ottawa. The larvae of white grubs and wireworms have done much injury to grain crops and potatoes, especially in Western Ontario. *Mayetiola destructor* (Hessian Fly) has been unusually noxious in certain districts, as were also grasshoppers, especially in parts of Norfolk County.

Caesar (L.). **Some new or unrecorded Ontario Insect Pests.**—*Ann. Report Entom. Soc. of Ontario, Toronto,* 1913, pp. 100-105. 7 figs.

After observing that *Rhagoletis cingulata,* seen on cherry trees near St. Catharine's on 22nd June, had not oviposited, the author discovered a number of *R. fausta* (Black-bodied Cherry Fruit Fly) on some other trees. The two species were subsequently found to attack cherry trees in about equal proportions, at Grimsby as well as St. Catharine's, and it is therefore probable that *fausta* may have done much damage attributed to *cingulata.* Nymphs of *Neurocolpus nubilus* and *Paracalocoris colon* were found on apples at Hamilton, a week or so after the blossoms had fallen, feeding on the fruit and producing depressions where they had done so. *Lygidea mendax* nymphs were also seen on 12th June, not in the fruit, but on the shoots growing from the crown of the trees.

Saunders (W.). **An Invasion of Cotton Moths.**—*Ann. Report Entom. Soc. of Ontario, Toronto,* 1913, pp. 84-85.

The author states that great swarms of *Alabama argillacea,* Hb. appeared about the station lights of London, Ont., on 12th October last year, and similar swarms of tens of thousands fluttering about each arc light had been noticed on the 6th at Clinton, New York. The moths disappeared after a few days.

Lockhead (Wm.). **Injurious Insects of Quebec in 1912.**—*Ann. Report Entom. Soc. of Ontario, Toronto,* 1913, pp. 85-86, 4 figs.

Eucosma (*Tmetocera*) *ocellana* (Bud Moth) was very abundant in the Island of Montreal; *Aphis mali* (Apple Plant Louse) did considerable damage on young trees; many larvae of the Clover-root Borer were observed on old red clover plants at Macdonald College, Quebec, where the Clover-leaf Midge was abundant on white clover leaves; the Striped Cucumber Beetle was destructive to squashes; the punctures of Raspberry-cane Borers wilted many canes in July; many Currant Saw-fly larvae were on currant bushes in June and July, and the Currant Aphis was abundant and greatly damaged the leaves.

Swaine (J. M.). **Notes on some Forest Insects of 1912.**—*Ann. Report Entom. Soc. of Ontario, Toronto,* 1913, pp. 87-92.

During the discussion on this paper, Dr. Hewitt, commenting upon the author's allusion to *Mesoleius tenthredinis* as an enemy of the Larch Saw-fly, suggested that parasitised cocoons should be collected and taken to places where an outbreak was beginning, so as to control it from the outset. In the course of his survey the author mentioned the diminution of the Spruce Budworm in Quebec; the defoliation in Algonquin Park of white spruces by *Lophyrus abietis*; the control of *Chermes similis* and *C. abietis* on shade trees by sprays of kerosene emulsion or whale-oil soap and by burning the galls from small trees; the serious

injury done to small white pines in eastern Canada by *C. pinicorticis*; the abundance at Ottawa on European and American larches of *C. strobilobius* and *Coleophora laricella*; the attacks upon spruce and pine of *Pissodes* in the Rocky Mountain and Riding Mountain forest reserves, respectively in Alberta and Manitoba; the abundance of destructive bark-beetles in the latter reserve, where, about Clear Lake, the dying bark of spruce, pine and larch in fire areas was attacked by *D. murrayanae*, Hopk., *D. simplex*, Lec., *Ips peturbatus*, Eichh, *I. caelatus*, Eichh., and *Polygraphus rufipennis*, Kirby; the driving of round tunnels by *Trypodendron retusus*, Lec., in poplar and *T. lineatus*, Ratz., in spruce and pine, with the introduction into the wood of the fungi and bacteria on the bark scraped by deer; the injury done to Douglas Fir in British Columbia by *Dendroctonus pseudotsugae*, Hopk., and to healthy *Pinus ponderosa* by *D. brevicomis*, Lec., *D. ponderosae*, Hopk., and other bark-beetles; the destruction of healthy white spruce in Eastern Canada by *D. valens*, Lec., which, like *Ips calligraphus* and many kinds of *Ips*, *Drycoctes*, *Trypodendron*, *Gnathotrichus*, *Polygraphus*, *Hylurgops*, *Pityophthorus*, *Pityogenes* and others, occurs in myriads in pine and spruce slash of last winter's cuttings; as long as extensive cutting continues there is probably little danger from any species discovered there this summer, but when cutting ceases, as it soon must, the second growth pine spruce will be in danger; the boring by *Pityophthorus* of white and red pine twigs, which, like those of other ornamental trees attacked, should be burned; the injury done about Port Arthur, Ontario, by *Bucculatrix canadensisella*, Chamb., and the outbreak there in summer, on the bark of twigs and branches of sound pine trees, of *Monohammus scutellatus*; the abundance at Ottawa of larvae of *Paralechia pinifoliella*, Clem., in the leaves of *Pinus banksiana*; the breaking of thousands of oak branches in the St. Lawrence Island parks by *Elaphidion villosum*; the destruction of imported white birches about Ottawa by *Agrilus anxius*, and of poplar in the east and in Manitoba by *Saperda calcarata*. This last, which infests the trunk and larger branches, has been taken from the heart of the largest balsam poplars. The borers should be removed in the autumn and the older larvae should be extracted with a knife, or benzine or carbon bisulphide should be injected into the borings.

Caesar (L.). **Arsenite of Zinc as a Substitute for Arsenate of Lead.** —*Ann. Report Entom. Soc. of Ontario, Toronto*, 1913, pp. 111-112.

The experiments made by the author show that trees sprayed with zinc arsenite were slightly more free from Codling Moth than those in which lead arsenate had been used; that both poisons were found of equal efficacy against Potato Beetles; and that in no case, whether combined with lime-sulphur or Bordeaux mixture, did zinc arsenite burn the plants. Being a fine powder, it is easier than lead arsenate to store, to pour, mixed with water in a pail, into the tank, and to keep in suspension in water. It costs two-thirds as much as the other, but is somewhat inferior to it in sticking qualities.

Notices concerning British Official Entomologists.

We are advised that the present distribution of the staff of the Union Division of Entomology, South Africa, is as follows:—

The headquarters are in Pretoria, a branch office is maintained at Cape Town, and a field station is located at New Hanover, Natal, for the investigation of insects attacking wattle (*Acacia mollissima*) only.

Head Office Staff.—Chas. P. Lounsbury (Chief of Division), Claude Fuller (Assistant Chief), C. P. van der Merwe (Entomologist in Charge of Nursery Inspection), F. Thomsen and Albert Kelly (Assistant Entomologists). Postal address: P.O. Box 513, Pretoria.

Cape Branch.—C. W. Mally (Cape Entomologist).

New Hanover Station.—C. B. Hardenberg (Entomologist in Charge), G. C. Haines (Assistant Entomologist).

Dr. C. Gordon Hewitt, Dominion Entomologist for Canada, left Ottawa at the beginning of September to inspect the work of the field laboratories of the Division of Entomology in the western provinces, and also the new plant quarantine station in southern Saskatchewan. He then proceeded to California to enquire into the entomological and quarantine work on the Pacific coast and returned by way of Utah, where the control of the alfalfa weevil, a possible Canadian pest, was investigated.

Mr. E. Ballard, Government Entomologist for Nyasaland, will shortly be leaving that Protectorate, having been appointed as Entomologist to the Government of Madras.

NOTICES.

The Review of Applied Entomology is intended to contain, month by month, abstracts of the latest information published concerning insects injurious to man or animals, as the carriers of disease; and to forests, fruit trees, crops or stored merchandise.

The Editor will be glad to receive prompt information of the appearance of new pests, or of known pests in districts which have hitherto been free from them, and will welcome any suggestion, the adoption of which would increase the usefulness of the Review.

Authors are especially requested to send to the Editor, as early as possible, copies of their papers for notice in the Review and for preservation in the Library of the Bureau, as it is hoped to form a complete collection of the literature of the subject.

Writers are also earnestly requested to send old reprints, as these are often very difficult to obtain.

Secretaries of Societies and Editors of journals willing to exchange their publications with those of the Bureau are requested to communicate with the Assistant Editor, 27, Elvaston Place, Queen's Gate, London, S.W.

The subscription to the Review is 12s. per annum, post free; or the two Series may be taken separately, Series A (Agricultural) being 8s., and Series B (Medical and Veterinary), 5s. per annum.

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